the thesis:
quintessentially Princeton
ideas
inspiration
resilience
passion
power
inspiration
freedom
questions
power
independence
ideas
growth
focus
challenge
discipline
process
growth
confidence
respect
significance
focus
inspiration
The faculty’s enthusiasm about their students’ work is precisely what makes Princeton so special. . . . This level of dedication and exuberance—from both faculty and students—is what makes the thesis experience ... so incomparable, so priceless, and so quintessentially Princeton.
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More than any other academic experience, the senior thesis embodies the defining characteristics of undergraduate education at Princeton. The thesis gives the student the opportunity to pursue original research and scholarship on a topic of the student’s own devising, with the guidance and supervision of a faculty adviser. What is most important, thesis writers and faculty members agree, is less the subject matter itself than the contribution of the thesis in developing traits that augur well for future success, no matter what one’s professional and civic commitments. These include mental discipline; independence of mind and judgment; the capacity to focus and pursue a subject in depth; the ability to design and execute a complex project; the skills of analysis, synthesis, and clear writing; and the self-confidence that grows from mastering a difficult challenge. At its best, the thesis enables students to make their own contribution to knowledge in their respective disciplines.

Requiring a thesis of its undergraduates sets Princeton apart from other colleges and universities where the thesis stands as an option that can be elected by seniors, often in the context of an honors program. Generations of Princeton undergraduates have approached the thesis with a mixture of fear and anticipation. Over the years most seniors have taken great pride in their work, sometimes surprising themselves and their professors at what they have been able to accomplish. While some students may take an indifferent attitude toward the project, the more remarkable fact has been the number of students who have caught fire intellectually in the senior year and produced first-rate theses.

I invited some seniors in the Class of 2006 to tell us about their experiences as thesis writers, and I asked their faculty advisers to reflect on their experiences advising those students as well as on the pleasures and challenges of thesis advising more generally. I posed some questions, but I left each of the writers free to decide how to respond.

As you read you will notice some recurring themes, both about the process of thesis writing and about what makes for a successful thesis. Here are some observations that seem to me to be especially well taken:

- Select your thesis topic as early as possible.
- Select a topic you are passionate about.
- Select an adviser who is interested in what you want to write about.
- Begin to write early on even if it is difficult (or even if what you write ultimately proves unusable).
- Good ideas actually come to you in the process of writing.
- Be flexible: don’t be afraid to change direction (or to take a tack different from the one you originally intended) if a better idea (approach) occurs to you as you proceed with your work.
• Keep an open mind to new ideas, to new data, to the relevancy of information you hadn’t thought relevant before.
• Test your ideas in regular conversation with your adviser, with other faculty members, with your friends.
• Leave time to rewrite and revise.
• Set a schedule and keep to it, even if some days are less productive than others.
• Don’t forget to have fun.

You will notice, too, that the seed for a student’s thesis often appears to have been planted in one or more courses taken in the first three years at Princeton. It is a good idea to keep an eye out for possible senior thesis topics as early as the freshman year and certainly during the sophomore and junior years. Junior papers often yield promising leads as well.

Other points worth noting include the following:
• A number of students make use of University funds to do research abroad.
• A number of students use summer internships to launch their theses.
• Some students begin their science research in the summer at Princeton.

You will be struck, too, by the number of times faculty advisers make a key point: at their best, students’ theses turn out to be learning experiences for the faculty, on occasion leading the adviser to say, “Why didn’t I think of that?”

I confess to having chosen strong students who wrote successful theses and who were pleased with what they were able to accomplish. But you should observe that, even in the case of the best students, thesis writing is never linear; there are plenty of challenges, detours, and false starts, and there is often more that could have been accomplished if time had permitted.

The individuals writing here are meant to be illustrative rather than representative. Important fields of study are not included, a function not of my judgment that some subjects are more important than others, but rather of which students had the time to respond to my request amidst the competing claims of new jobs, new marriages, and graduate study. For all of the obvious omissions, I am confident that these accounts provide a real and immediate sense of the most distinctive aspect of undergraduate education at Princeton, a tradition of serious engagement in scholarship of which generations of students and faculty are justly proud.

Nancy Weiss Malkiel
Dean of the College
My thesis was what I like to call a “complete experience.” That is, it was neither all good nor all bad. Thanks to my adviser, however, it was mostly good.

I explored the influence of personal contacts on marital homogamy. I wanted to investigate how friendships and relationships may impact why people tend to marry others similar to themselves. The topic was born when I read *Getting a Job: A Study of Contacts and Careers* by Mark Granovetter, one of several books my adviser suggested I read to explore what sort of approach to take with my own research. Granovetter investigated how participants utilized their personal networks to find jobs. After reading it, I thought, “Whoa! It would be great to research if people use their friends to find mates in the way they use them to find jobs.” Also, since I had some sneaking suspicions about how the sociological aspects of friendships, like race, influenced dating relationships, it made sense to me to examine if using a personal contact also influenced the socio-aspects of marriage such as race, religion, and education, and the similarities between husbands and wives in these areas.

To carry out my study, I interviewed 50 women and asked them how they met their husbands. This was one of the most rewarding aspects of my thesis for two reasons. First, the women permitted me a glimpse into an intimate aspect of their lives—their marital romance. I was told stories about meeting husbands on blind dates, in classes, at parties, even bars, and of course, through friends. I felt extremely lucky to be working on research that essentially allowed me to analyze love stories. I may have been frustrated, tired, and stressed about my thesis at times, but I was never bored.

The other rewarding aspect of this part of my thesis was discovering the advantages of being a Princeton student writing a thesis. (Yes, I know it seems strange, but there are advantages.) Finding 50 women to interview proved to be quite a challenge. After trying several methods that yielded few results and a time crunch, I decided to utilize the Princeton alumni electronic database, TigerNet. I was reluctant to use this method because I knew it would skew my research in certain ways, but the pilot characteristic of the study provided some experimental legroom. I looked up which Princetonians had been married between 2004 and 2005 and e-mailed those with e-mail addresses. The response was overwhelming. Within 20 minutes of sending the e-mail, I was making appointments for phone interviews. Because the alumni were so intimately familiar with the thesis process, they were quick to come to my rescue. I did not have to convince them too much of my desperation or validate my reasons for their participation. Consequently, not only did I get participants, but I received many e-mails of encouragement, and participants also recruited friends for the study. Although I wanted a more representative sample, and using alumni was
my last resort, this experience demonstrated to me what a special process writing the thesis really is. We talk about the tradition of the thesis and how we are joining the ranks of survivors once we finish, but I had an opportunity to experience the reality of this bond that joins countless Princetonians together. Without the alumni who understood exactly what I needed, it is doubtful that I would have been able to do the research I did. I thank them (and their spouses!).

In this equation of what made my thesis experience a good one, the formula would be incredibly lacking without mention of my adviser, Professor Paul DiMaggio. He combined competence and compassion in a way I have never seen in any human being before, and this is no exaggeration. He was as devoted to my thesis as I was. At times he believed in the work that I was doing more than I did, and this belief was invaluable to me in the thesis journey. Without him, I would not have discovered the intricacies, subtleties, and surprises that were hidden in my research. For instance, although I was exploring the role of contacts in similarities between spouses, analyses of the data seemed to demonstrate that structures such as schools, churches, and workplaces were just as important as contacts in a wife meeting her husband and meeting one that shared the same characteristics as the wife. This was certainly not a finding I was expecting, but Professor DiMaggio was quick to point it out, encourage me to investigate further, and put it in my thesis. His constant exploration of my work and his concern for it and me made my thesis experience better than I could have imagined.

Professor DiMaggio’s patience and kindness were especially important because I was working on theses for both sociology and theater. I was researching, writing, acting, and wondering if I was going to survive. Whenever I expressed doubts of my survival to my adviser, he always assured me that I was going to make it because he knew I could. Working with him was absolutely amazing and made writing my thesis enjoyable, even when it was not.

It was in my relationship with Professor DiMaggio that I recognized some things about writing about a thesis that I would like to share. First and foremost, try to choose an adviser who encourages and challenges you. I never left a meeting with my adviser feeling as though he had given me too little work. Yet, I also never left feeling as though he not given me the tools and courage to do the work. Second, meet with your adviser as often as possible. Professor DiMaggio was clear about this from the beginning; I loved it, and it was incredibly helpful. Lastly, remember to eat, sleep, eat, exercise, and hang out. It will help! Until the two weeks my thesis was due, I refused to stay up all night if it was avoidable, and I studied and wrote my thesis with other students as much as possible. People, food, sleep, and a good adviser will ease the process. Oh, one more thing: The thesis is the
thesis, not life. Keeping a healthy perspective on your work, your life, and your health is very important. It is difficult to do, but it is definitely worth it.

Paul J. DiMaggio
Professor of Sociology

The world is the sociologist’s oyster. Think of the discipline as a massive knowledge-producing machine—a perspective and an array of powerful ideas harnessed to a set of analytic tools. When the machine is up and running, few empirical questions can stand up against it, and no topic is out of bounds. All this freedom makes choosing a thesis topic difficult, but it also makes it possible for students to find topics that are timely, personally meaningful, or, as in Sarah Adeyinka’s case, both. When I first spoke with Sarah, she wanted to study how the Internet fosters intimate relationships. I study and teach about new information technologies, and (in the pre-Internet era) had even written a paper about marital selection, so I was pleased to work with such a bright and motivated student on a topic of mutual interest.

The hardest part of writing a thesis is getting from an interesting phenomenon to well-defined questions and an actionable research design. Usually, the adviser must persuade the student that research is harder than it looks and that a prompt start is critical. Sarah made it easy, setting weekly appointments from the beginning and appearing at each one with a memo, a draft, or some other sign of tangible progress. Just as a photographer must find the right frame (too wide a space will leave the object indistinct, too tight a focus will provide insufficient context to interpret it), the researcher must narrow the question to make it tractable, while broadening her focus to gain comparative leverage. For Sarah, this meant narrowing her focus (just a little) to young people’s marital choices, and expanding it to include all the ways that people find their spouses. The latter was crucial because, to understand the role of the Internet in marital choice, we need to know how common it is compared to other strategies, and how people who find spouses online differ from those who locate them the old-fashioned ways. This was a fateful decision because the well-educated young people whom Sarah studied turned out to marry friends of friends far more often than people they met online.

The second hardest part of writing a thesis (for students with the intellectual ambition to attempt it) is collecting original data. No agency gathers up-to-date information about new marriages; very few existing data sets contain information on how spouses met one another; and none of these are current enough to be useful to someone interested in online matchmaking. So Sarah had to collect her own data. I thought she could go to our county courthouse and get a list of people who had taken out marriage certificates in the previous year (fortunately Mercer County is about as close to a microcosm of the U.S. as
one can find) and then ask them for interviews. But local officials were so solicitous of their constituents’ privacy that gaining access to public records within the necessary time frame proved impractical. Next Sarah looked at wedding announcements in local newspapers, but learned that most marriages don’t get announced at all, and that the couples whose marriages were announced often lived outside the Princeton area. Because many people marry in churches, we next assembled four local clergymen (Sarah’s pastor, a loyal Princeton alum, a poker buddy of the adviser, and the pastor of a sociology colleague), who agreed to contact people married in their churches during the previous year on Sarah’s behalf. This method yielded only a few results.

Sarah was learning an important lesson: the greatest threat to any social-science research project is the recalcitrance of the human material from which one must extract one’s data. (This recognition accounts for much of the popularity of archival research and of statistical analyses of archived data or official statistics among seasoned researchers.) But the clock was ticking. We agreed that Sarah should give up on statistical representativeness and instead focus on a group that was both available and particularly interesting: recent Princeton graduates. Sarah used her own networks (starting from several diverse “seeds” in order to maximize the heterogeneity of her informants) to identify several dozen Princeton alumnae who had married in the past two years. She developed a detailed questionnaire to extract comparable information from each woman on herself, her mate, and (when applicable) the person who introduced them. She also spoke less formally with each informant, letting each tell the story of her courtship and marriage in her own way.

Gathering these data, putting them into computer-readable form, conducting statistical analyses, making tables and charts, and integrating the women’s narratives and the statistical results was challenging and exhausting. But at least Sarah was in control, no longer dependent upon the kindness of strangers, and she met these challenges with unflagging energy and with demanding standards. By this point, my role was to help Sarah interpret her statistical results, provide editorial advice, and try to convince her to get some rest and appreciate just how well her thesis work was turning out.

It turned out very well indeed. By examining the way that personal social networks affect “marital homogamy” (i.e., marrying a spouse who is similar to yourself), Sarah’s thesis did something that no one had done before. Princeton grads tend to meet their spouses either at school or, after graduation, through friends. Personal networks can lead them to spouses who are similar on important dimensions, like holding Ivy League degrees. But because people with Ivy League degrees differ with respect to such things as race, religion, and career plans, the same ties that lead to “homoph-
ily” on one dimension may generate difference on some other. Sarah’s study also explains better than any other I have read why residential colleges and universities are such effective matchboxes: Where else are people thrown together with many age-mates, pre-selected for academic achievement and (unintentionally but effectively) prosperous parents? Where else do their daily routines expose them to so many different people (different companions in every class) similar to themselves (given that they chose the same courses—and failing that, dozens of extracurricular activities provide further social focal points to find like-minded friends)? And where else can a young person so easily find mutual contacts to vouch for the good character (or lack thereof) of a potential mate? One conclusion from Sarah’s work: If an entrepreneur set out to design the perfect marriage market, it would look a lot like Princeton. With a thorough and perspicacious literature review, original data, and striking and original results, Sarah’s senior thesis went well beyond what one would reasonably expect an undergraduate with less than eight months (and a full load of other courses) to accomplish—much more like a master’s thesis from a full-time graduate student.

I think that Sarah learned a lot from the thesis project, both about research and about the subject she set out to study. I learned a lot, too. For me, it was an opportunity to catch up with the literature on a topic of interest, share in the excitement of discovery, and even come up with ideas for a couple new research projects that follow from Sarah’s findings. I am keeping them in a special file against the day that Sarah (who would be a terrific sociologist) decides that sociology is her vocation. And if that day never comes, then who knows?—I might do the studies myself.
have always been a last-minute worker, but I thought that for once, with my senior thesis, I would be on top of things. I had a great experience with both of my junior papers, and I decided to ask Professor Daniel Rodgers, who advised my spring independent work, to advise my thesis. By May of my junior year I had a tentative topic and an adviser I knew I worked well with. I was ahead of the game. By December of my senior year, however, after doing a significant amount of research, I realized that my chosen topic was not as rich as I had hoped it would be. I was faced with a dilemma over winter break: continue work in an area I no longer found stimulating, or scratch the project and begin anew, putting myself three months behind schedule. At first I did not put much stock in the second option, since I had no clear alternative topic in mind. Then I came across a few paragraphs in an essay I was reading for my original topic linking white Communist teachers in Harlem public schools to a movement to improve school conditions in the 1930s. I was drawn by this tantalizing bit of information and its potential implications, so in mid-December I embarked on a new research project: the formation, tactics, and broader significance of the Depression-era Committee for Better Schools in Harlem, a grassroots movement to improve school conditions. During the Great Depression, Harlem was poverty-stricken, faced with external racial prejudice, and rent by internal social, economic, ideological, and ethnic differences. I could not resist this story of effective community mobilization in an environment far from conducive to collective action.

Perhaps it seems crazy that I started over so late, but the best advice I can give is to choose a topic you are passionate about, because a senior thesis is a long and demanding piece of work. Does that mean changing your topic in December is a good idea? In the interest of your health and sanity, definitely not. Would I do it again? Yes. With my new topic, I was genuinely interested in what I was working on, and able to see contemporary relevance to my historical research, which was important to me. I worked feverishly because I was so far behind, and the thesis-writing process was more stressful than average. I had some background in the area of my thesis from my spring junior independent work, and this proved very helpful. I wrote that project on an early 20th-century Washington, D.C., court case that touched on inter- and intra-racial color distinctions and efforts on the part of the capital’s black elite to ensure continued academic education for the city’s colored residents. I was familiar, therefore, with some of the most important early debates surrounding black education. My spring JP was not so close to my thesis topic that I could use it as a chapter—if you are farsighted enough to manage that, you are much more organized than I am—though I do not regret working on three unrelated (or at most loosely related) projects for my independent work. Original research demands a higher level of immersion in your subject matter, which can be both reward-
ing and exhausting. I learned more from those research projects than from any single academic course I took at Princeton.

I would never have gotten so much out of my senior thesis without the help of my adviser, who was central to the project’s successful completion. Here, as with my topic, things took an unexpected turn rather late in the process. As a result of illness, Professor Rodgers was unable to continue working with me, and Professor Kevin Kruse became my adviser after winter recess. This change had the potential to add to my anxiety (it did put me a bit more behind), but Professor Kruse turned out to be a terrific match. Not only was he knowledgeable and enthusiastic about the area in which I was working, he was unfazed by how behind I was and by my obvious nervousness. I have no idea what kind of impression I made running breathless into his office and rattling off my ideas at a speed made possible by progressively larger cups of Starbucks coffee. He always calmed me down and had useful research suggestions whenever I needed them.

Where I found Professor Kruse’s help invaluable was in the organization of my ideas. No matter how confident you feel after completing your junior independent work, carrying a theme through 100 pages and several chapters is very different than carrying one through 30 or 40 pages. I have a tendency to lose sight of my overarching point in a mass of detail, but Professor Kruse helped me to tease the broader themes out of my material. He read my chapters whenever I sent them to him, always returning them with detailed comments within a few hours, despite his own busy schedule. I could not have asked for a more responsive adviser. The comments themselves were penetrating. In a half-page of text Professor Kruse would suggest that I switch the order of several paragraphs, cut extraneous material, or expand on a point, draw some conclusion more forcefully, and—voilà—the shell of my ugly duckling chapter would fall away to reveal one clearer and more concise. Nothing in my Princeton career made plainer to me the difference years of academic study and experience make, and how lucky I was to benefit from such close attention, than these “magically” insightful comments.

As one might expect, even with a supportive adviser, a lot of pressure comes hand in hand with a lot of academic learning. So at the risk of sounding clichéd, I recommend keeping your sense of humor and making time for your friends throughout the thesis writing process. Princeton makes this easier by demanding that all seniors write theses. The result of this policy is that all of your best friends are with you in the library at all times. If you are creative, you will find that Firestone can be surprisingly conducive to social activities. Setbacks in your work are also best laughed off if at all possible. Some of my most frustrating moments, and those of my friends, were suddenly hilarious when offered up for group consumption. The time when, returning from a New York research trip, the Dinky lost power on a freezing February night, stranding me at Princeton Junction without cash to pay for a taxi home since I had spent it all on photocopies in the archives that afternoon (I called a friend to pick me up); the time a NYC public school official mysteriously insisted I could not have access to payroll records from 2000
...I recommend keeping your sense of humor and making time for your friends throughout the thesis writing process.

When I asked for student ethnicity records from the 1930s; discussions I will politely describe as “heated” with employees in various archives over whether I could have access to 70-year-old surveys no one else was interested in; these were all fodder for great dinner conversations.

While I encountered people who seemed determined to impede my research, there were other individuals, some totally unconnected with Princeton, who went out of their way to help me when I shared my enthusiasm for what I was working on. In one case the director of the public school archives in Washington, D.C., who was alone in her office since her assistant had recently quit, took a reel of microfilm all the way to the public library and printed records for me, since her archive was too poorly funded to have a printer of its own.

Between Professor Kruse’s advice, the camaraderie among my equally frantic thesis-writing friends, and the help that I received above and beyond the call of duty from a handful of librarians, archivists, and other friends of my project, I managed to complete a thesis. What I most enjoyed in my research was the chance to contextualize the first successful collective movement in 1930s Harlem, which historians had almost entirely overlooked. I drew connections between the Better Schools movement and a variety of relevant political activity and theoretical debate: Harlem and NYC politics in the shadow of the 1935 race riot, disagreements over the best path to racial uplift, and a broader crisis in educational theory during the period. How coalition politics work in such an uncertain environment and the restrictions imposed by the situation and the approach were at the center of my inquiry. I would not offer my experience as an imprint for senior thesis writing. The path I took to completing the project was far from ideal, full of detours and moments when I tripped over nothing more than my own two feet. I am fairly sure that you cannot see how messy the process was in the final result, and that is how it should be. So, take heart—if I managed to finish a thesis and benefit from the experience, so will you.

Kevin M. Kruse
Associate Professor of History

When I took Sara Asrat on as a thesis advisee, I was, quite frankly, a little worried. For one thing, we'd never met before. Normally, the seniors with whom I work are students that I've already gotten to know very well. I've usually taught them in smaller classroom settings once or twice and, more importantly, worked with them in some capacity on their junior-year independent projects.

More worrisome, though, was the fact that she was coming to me incredibly late in the process. I normally encourage my thesis advisees to start their research during the summer before their senior year, if not earlier;
Sara, however, only became my advisee midway through her senior year. Her original adviser had been forced to withdraw because of a medical crisis and asked me to take over with Sara after winter recess.

As if switching advisers wasn’t going to add problems enough, Sara told me at our very first meeting that she wanted to scrap the work she’d already done on her original topic and start over with a brand new one. This, I thought, would be impossible. With only a few months to go before the April deadline, she would have to absorb a massive amount of secondary literature on the new topic, travel to the archives to do heavy research in the appropriate microfilm and manuscripts, and then still write and revise a hundred pages or so. I tried my best to dissuade Sara from making what seemed like a horrible decision, but she stood her ground politely but firmly. The new topic—the history of African American education in Harlem—was important to her, she said, so much so that she would pursue it with all her energy. I’m a firm believer in letting a student’s passions help shape their intellectual pursuits, and Sara’s commitment to the new project seemed clear. Against my better judgment, I relented and let her start the thesis over.

Sara’s spring semester was, I’m sure, a blur. Between numerous research trips to New York City, endless hours in the library, and the long days and nights of writing and revising, there wasn’t a minute left to spare. What’s more, we met early and often during the semester, talking over research strategies and working our way through different analytical approaches to her material. Sara proved to be a tireless researcher and writer, turning in chapter drafts to me with stunning speed and then incorporating my comments and criticisms with incredible skill.

The end result was simply amazing. Her thesis offered a detailed and wide-ranging study. To my amazement, Sara had conducted an exhaustive campaign of primary and secondary research in the short amount of time she had. In terms of archival research, she probed official government records, including those of the Board of Education, Mayor Fiorello LaGuardia, and various other city and state agencies; the records of black activist organizations, such as the NAACP and the National Negro Congress; and the papers and memoirs of key individuals at the heart of her story. All of this archival work, meanwhile, was balanced with a deep exploration of contemporary news accounts from the mainstream, black, and union presses. The rich array of primary material, in turn, was bolstered by a broad reading in the secondary literature. Drawing on this wealth of primary and secondary materials, she succeeded in exploring multiple avenues of inquiry—the impact of the economic crisis on education, the national and local debates over black schooling, the internal conflicts within Harlem, and so on. Impressively, the thesis wasn’t simply well researched, but well written too. Despite the short timetable for writing and revising her chapters, Sara succeeded in It was, in the end, the very model of a senior thesis. Grounded in a deep array of archival and secondary sources, it possessed an argument that soared beyond the specifics at hand and touched upon larger matters.
presenting her argument in crisp and clear prose, making her case all the more engaging for her readers.

It was, in the end, the very model of a senior thesis. Grounded in a deep array of archival and secondary sources, it possessed an argument that soared beyond the specifics at hand and touched upon larger matters. Even though I’ve read fairly widely in the fields of African American and urban history, I still learned a great deal from Sara’s thesis, especially about the nature of black protest and the complex relationship between urban schools, minority communities, and the modern city at large—an issue that America is still reckoning with today. I came away from the thesis deeply impressed. My colleagues in the department were just as taken with Sara’s work and awarded her thesis our top prize in American history.

I would strongly encourage other students to follow Sara’s example, by choosing a topic that intrigues and engages them and then pursuing it with dogged determination. I would, however, recommend against a January start.
There is something exciting about taking risks, particularly when a payoff may exist. This is no different in science, where the certain path is rarely the best way to go.

I had been extraordinarily fortunate and particularly lucky to make some progress in the field of prion research at the National Institutes of Health during my first undergraduate summer. The prion protein is a curious little molecule, best known for its self-propagating nature and the disastrous consequences of having it in the wrong form. However, the most interesting aspect of this protein may be its normal presence in every mammalian brain. We all know that nature does not mess around, and a gene that simply caused dramatic and rapid neurodegeneration would quickly disappear from the population. So I got to thinking, and came to the idea that the very same form of the molecule that we showed to be highly pathogenic may also be an important protector of neurons under different conditions. This in and of itself was an ambitious proposal; the means to support it, I was told, were even more demanding and uncertain. Not only was I going against the ideas of the standing research establishment, I proposed to do it in very unconventional ways.

And so I found myself near the close of my sophomore year, ready and eager to take a major scientific gamble. I saw the thesis as a perfect opportunity to follow my ideas; however, as always, there were a few small issues. The first was that the approach I wanted to take was fairly equipment intensive, requiring ready access to a confocal microscope. Second, I wanted to work in a live culture system with primary cortical neurons; again and again, I had heard that this would be an impossible challenge to accomplish in the timeframe I had, and was particularly labor and material intensive. Third, I intended to study abroad in England the spring of my junior year, right when junior papers and the set-up for thesis lab work starts. Finally, and most problematic, there was absolutely no one at Princeton who worked even remotely with prions. Nonetheless, as soon as I formulated my intentions to pursue the prion idea, I set out to find a microscope, embryonic rat brains, and most importantly, a professor who would be willing to support my project despite all its risks, uncertainty, and general lack of applicability to their own research. I needed someone who was a true scientist, ready to take on a gamble for the sake of promoting intellectual thought and the progress of science. Fortunately, my search did not take long at all; soon after explaining my “crazy idea” to Professor Lynn Enquist, who happened to have both the critical components of access to a confocal microscope as well as the necessary animal parts, I received (much to my surprise) the quite supportive and unconditional “just go ahead and do it, and we’ll worry about the details later.”

I started work in the lab early on, with the hopes that I could overcome some of the technical challenges involved with primary cell culture. I had
moved along quite a bit by the time I was off to study abroad in Oxford, where I wrote my junior paper. Professor Enquist was kind enough to advise me electronically; the editing and finalization of the JP took place in Internet cafés across Europe while I was travelling for 45 days. One must never be afraid to complete work in alternative ways; if anything, it adds a touch of creativity to the effort.

After returning to Princeton, I began work in earnest. Unfortunately, science does not always cooperate, and a critical early aspect of my experimentation, transfection of the primary cultures to overexpress tagged prion protein, simply would not work. I struggled with this for months, and as the spring came around, it seemed that my gamble would fail. However, Professor Enquist stayed true to the wonderful scientific attitude that had drawn me to work under him in the first place, and instead of dissuading me or forcing me to give up, he encouraged my perseverance at the project; “well, try it again” became the typical end of our regular discussions. With only a few weeks left to spare, however, everything fell into place. We now found quite clearly with visual evidence that the endogenous prion protein, the very same molecule that can cause dramatic pathogenesis, was an important factor in preventing neuronal apoptosis—this was a major step to understanding a novel neuroregulatory system. Sometimes, the scientific gamble does indeed pay off.

And that is likely the most beautiful thing about the thesis, and Princeton itself. The thesis is something with which you can push the intellectual envelope and take risks. In this way we grow, and make the most out of our efforts and experiences. It is only by taking such chances that a student may be sure that he or she will change, and may be able to change the world. Don’t be afraid to propose an utterly new idea, even if it may be quite different than anything anyone studies, as more likely than not you will find the support to carry it out. Be innovative, ambitious, and academically audacious; so go ahead, throw down the dice. You need to.

Lynn W. Enquist
Professor of Molecular Biology

I’ve advised many exceptional juniors and seniors in the molecular biology department, but my experiences with Suneel Bhat gave new meaning to the phrase “and now for something completely different.” Suneel was not a molbio major, he wasn’t really interested in my subject (virology), he was interested in something (prions) that I knew almost nothing about, he wanted to use my expensive microscopes that I reserve for my graduate students and postdocs, he wanted to grow a type of neuron that my lab doesn’t study, and finally, he wanted to do his junior paper while traveling...
in Europe. A sensible reaction might have been to show him the door, but I was fascinated with this incredibly energetic young man who was proposing experiments that would be daunting for a graduate student. When he caught his breath, I slipped in a few questions to determine if there was some substance beneath this amazing chutzpah. Every question was countered with a reasonable answer. I was hooked: I just had to see what Suneel could (or would) do. So I took a deep breath and said, “O.K., let’s give it a try.” It was a remarkable experience for both of us. The long distance e-mail battles to get him to focus on one or two ideas instead of 20 were stimulating. He seemed to find new papers faster than I could. I realized that every e-mail seemed to be coming from yet another city or country. Surprises abounded: e.g., while working with him on his junior paper, I saw an article about his work building houses for the needy in India. When his junior paper emerged (just before it was due), it was exceptionally well done, focused, and well written. Nothing fazed Suneel; he was indefatigable.

He returned to work in the lab under the supervision of one of my postdocs. Suneel had to run though the equivalent of molecular biology boot camp; he survived every challenge. In short order, he was integrated into the daily routine of my lab. I was amazed at his technical skills and verbal jousting ability. My students love to argue and Suneel gave as good as he got. In less than a month, he had developed a protocol to grow his special neurons using reagents and tissues that were discarded during our normal cell culturing procedures. Much to the amazement of all, he came to the lab with reagents that he had made in previous work at the NIH. He claimed to have a refrigerator in his room stocked with such reagents. However, it all wasn’t rosy—the final steps of introducing his DNA constructions into neurons were not easy. I told him we had experienced serious problems in the past and that I really doubted he could crack the problem in the short time he had left. The struggle to find the solution was painful for both of us. He had more failures than I suspect he had seen in his short career in research. I kept telling him that if he just could stick to a systematic approach and fight his urge to change 20 things at once, the science spirits might smile on him. Amazingly enough they did. About two weeks before the thesis was due, he obtained his first positive results. For an adviser, nothing can describe the moment when a student calls me into the lab and says, “Look, it worked!” I don’t know who was more relieved, but we certainly enjoyed that feeling of success together…and that feeling makes it all worthwhile. It’s hard to say who learned more in this “quintessentially Princeton” thesis experience.

I was amazed at his technical skills and verbal jousting ability.
As I sat in a CEE 262 lecture, “Structures and the Urban Environment,” my sophomore spring, my mind began to wander about my choice of a major. What did I want to do with my life? How was I going to finish all my problem sets? Why in the world had I chosen civil engineering of all things? Why wasn’t I sitting in a history lecture or a politics precept? It was this class, taught by Professor David Billington, that reinforced my decision made by that somewhat clueless high school senior a couple years earlier. Professor Billington illustrated the many sides of structural engineering—those that went beyond number crunching and analysis. I became fascinated with the idea of structural engineering as art, as well as all the political and economic aspects that frame an engineering project. That semester I realized that bridge design was the field I wanted to pursue, and also that Professor Billington would make one heck of a thesis adviser.

Now, don’t get the wrong idea—I was just a sophomore who had only heard horror stories about this so-called “thesis.” I wasn’t making any big plans or starting to search for a topic at that point. As far as I was concerned, there were a lot of problem sets and midterms I had to think about first. When the time came to choose a topic, however, I remembered the impression that Professor Billington had made on me. I wanted to find a topic that would allow me to combine engineering with historical and political elements, while also involving my interest in bridge design. After coming up with a few very different ideas, I met with Professor Billington and we discussed possible paths to take. I was familiar with the works of T. Y. Lin, a structural engineer who had designed bridges throughout the world, while also making significant contributions to the development and use of prestressed concrete. I brought up the idea of writing some sort of biography of Lin, but doing so through his contributions to the engineering field through research and design. I knew very little about T. Y. Lin’s life and was not completely certain such a topic would work. After bringing up the idea with Professor Billington, however, I was extremely excited. He seemed to share my enthusiasm and immediately started writing down names of people to contact, books to read, and what kind of things I should be looking for in the early stages of my research.

I have to admit, though, I was not completely sure what direction my thesis would take once I began researching. There was not a lot of information available. Very little documentation existed about Lin’s life, and what little I could find came from engineering journals that focused on his research. Additionally, I had chosen one of Lin’s more unique, yet lesser-known, bridges to serve as the focal point for much of my thesis. Between searching for biographical information on Lin or calculations and technical information about this particular bridge, I was really struggling. But this was the reason that I truly enjoyed my thesis. In order to find information for my thesis, I had the opportunity to fly out to San Francisco to interview friends,
colleagues, and family members of Lin. I also had the opportunity to go through the University of California–Berkeley’s manuscript library, which has boxes of articles, technical papers, sketches, photographs, and other personal documents that Lin had donated years before.

Compiling all this information allowed me to piece together the life and legacy of Lin. This was the most fascinating project I have ever completed. Here I was writing a civil engineering thesis, but I had the opportunity to act as a historian on top of performing engineering analysis. It did get frustrating, especially with the lack of information about the bridge I was analyzing. But it taught me to think in a different way and use skills and judgment I had come to acquire though my years at Princeton.

Perhaps most important, however, was Professor Billington’s help and guidance. Our weekly meetings provided me with assistance and direction, but Professor Billington also gave me confidence. I would often second-guess my work or wonder why I had chosen a topic that incorporated numerous aspects of civil engineering. But after our meetings I would leave his office believing that, yes, this thesis was going to be completed on time. And yes, my research was getting me somewhere. And most importantly, that yes, this was an incredible journey. Writing a thesis was not a daunting task that one needs to complete in order to graduate. It was enjoyable and fascinating. It caused stress and frustration throughout the year, but it was also an extremely rewarding experience. By actually going through the process, I had the best academic experience of my years at Princeton.

So from these personal experiences, I offer you just a few pieces of advice. Most importantly, choose a topic that you can see yourself getting really excited about. Make it something you want to talk to people about at dinner or explain to your friends and family. If you are enthusiastic about your research, it will come through in your writing and make the process a lot more enjoyable. Secondly, find an adviser that you can really talk to. I learned a great deal from Professor Billington because he was a professor I could easily communicate with and feel comfortable around. Lastly, stay confident. The thesis process can get a little overwhelming at times, but it will always work out if you keep trudging through it. As was the case in my research, it is often the solutions to those struggles that lead to the most exciting part of the thesis process. If you keep these three things in mind, your hard work will result in a completed thesis that really wasn’t so bad after all. In fact, you will probably find yourself admitting that you enjoyed it—and I hope you do.
I have known JoAnna Billings since her first year at Princeton when she was in my precept in one of the large lectures courses I give. We met a number of times after that, and she asked to have me as her thesis adviser. When she described her idea for a thesis—on the life and works of T. Y. Lin—I was both surprised and doubtful. I had known Lin well since 1958, when I was a member of a six-man delegation of engineers that he led to study concrete construction in the Soviet Union. I had followed Lin’s career rather closely since then and knew it to be widespread and complex. This background helps explain why I questioned JoAnna on her proposal. Also, Lin’s early career was in China, and in his American career he was a well-known academic at the University of California–Berkeley, the founder of a large and successful consulting engineering company, and within the profession of structural engineering, a public figure incessantly traveling worldwide. He was also controversial. But, although I cautioned JoAnna on the complexity of such a project, she was firm in her wish to take on this prolific engineer. There were to be three parts to her study: first, archival research mostly in the Bancroft Library at Berkeley; second, oral history with several colleagues of Lin’s; and third, a detailed analysis of one of his most creative bridge designs.

During JoAnna’s senior year, as we met weekly, I began to realize that she was amassing far more material on Lin than I had known about. She proved skillful in interviewing key people who knew T. Y. Lin, including his grandson, Erik Lin, a graduate in civil engineering from our department in the Class of 1998. But the most challenging part for both JoAnna and me was to work on understanding the bridge that Lin had designed for Costa Rica. Construction was completed in 1972, but since then, remarkably little had been written about it. JoAnna found that Erik Lin had the drawings, which he was kind enough to copy and send to her. Thus, she could make a detailed analysis not only of the final structure, but of phases during construction, since the deep canyon necessitated an elegantly worked-out sequence of building.

This was that rare type of senior thesis where student and adviser are trying to learn at the same time. She carried her structural study of this Costa Rican bridge far enough to permit me to add this striking work to our archive and to the course I teach, “Structures and the Urban Environment.” Furthermore, it is well worth publication in our best bridge journal, a project we intend to pursue. In addition, with her archival research and oral history, she has provided an initial basis for a full biography of this exceptional engineer.

JoAnna’s thesis illustrates well what appeals to me the most in advising these theses: the opportunity to establish a close professional friendship with an undergraduate, the chance for me to learn something new and useful in my teaching, the idea of an undergraduate making a contribution to the scholarly advance-
ment of our field, and observing how much such students have advanced intellectually since I first taught them, usually in their first or second years.

Based on many years of advising theses in structural engineering, I find that the most crucial factor, apart from the choice of a sound topic and an enthusiasm for it, is to complete the numerical-mathematical part early and then move to the evaluation and comparative part later. Nearly all the theses I advise have these two parts—a deep analytic section that calls on the skills students have learned and a broader evaluation section that relates the analysis results to cultural questions. JoAnna's thesis excels in both—the detailed analysis of a complex bridge structure and the cultural setting of a brilliant Chinese-American whose career context first is in China, then the United States, and finally throughout the international engineering world.

This was that rare type of senior thesis where student and adviser are trying to learn at the same time.
My introduction to independent research at Princeton took place in my junior seminar, a fall semester requirement in the history department. The topic of my seminar was “Atomic Legacies.” Originally, I was not looking forward to it. I had little interest in nuclear science (I would have preferred the biological and medical sciences), but since “Atomic Legacies” was the only history of science seminar offered, I decided to enroll. One of my concerns about taking a seminar in a subject area I was not exactly passionate about was the junior paper, which I looked forward to in a way because I loved independent work in high school, but I also dreaded the JP after hearing upperclassmen complain about being stuck with a topic they despised or, even worse, were just bored with. As the seminar progressed, I became increasingly intrigued by the far-reaching cultural implications of the development of nuclear technology, and I began to recognize ways in which I could combine my questions about the societal effects of this new technological development with areas that had traditionally held my interest, such as foreign policy. Instead of focusing on military history or the U.S. perspective on nuclear development, I decided to try to explore areas of the history of nuclear development that I had not seen much secondary literature on. However, while I was interested in obscure aspects of the subject matter, I did not know how to go about learning more about these areas.

Fortunately, the professor teaching the seminar, Angela Creager, had received a grant that allowed her to take students to the National Archives in College Park, MD. Archiving was a completely new concept to me; while I had used primary documents like newspapers before, the weekend spent sorting through the masses of information contained in the journals, photos, government documents, and other sources held in the seemingly infinite cardboard boxes in the archives awakened my interest in finding out what else was out there. Upon leaving the archives, I realized I had found both an exciting new venue for independent research and a JP topic, which focused on the far-reaching effects of the U.S. Atoms for Peace policy on Latin America.

The idea for my thesis topic grew out of this visit to the archives. Upon completion of my junior paper I found that I had even more questions than I began with, and I chose to focus my topic on a geographic area in order to fully explore the implications of the development of nuclear technology and related U.S. policies for Argentina. Princeton offers amazing funding opportunities for thesis research, and I took advantage of funds provided by the Davis Center for Historical Studies, the history department, and the Office of the Dean of the College in order to travel to pursue further archival research for my thesis.

I secured enough funding to enable me to travel to Argentina for three months and visit various archives in order to explore the unpublished docu-
The time I spent in Argentina was by far both the most challenging and rewarding period in my academic career. Not only was I living alone in a foreign country, but I was trying to find information that I was not even sure existed (a problem with trying to complete research through unpublished documents). Furthermore, in Argentina I was often presented with many large, dusty cardboard boxes with dates written on the side to sift through, which was a far more time-consuming and frustrating process than I had experienced in the U.S. archives. However, when I did find a document that was relevant to my topic, the effort became totally worth the arduous process of scouring hundreds of dusty pages.

Eventually, I learned how to navigate the Argentine archival system more quickly, and I learned that, instead of searching for very defined information, I should instead follow the trail that the documents provided, even if it didn't take me where I thought it would. In this spirit, I was also able to travel the country, exploring Argentina's varied landscapes while also searching for information for my thesis. Fortunately for me one of the archives that was integral for my research happened to be located in Patagonia, thus allowing some post-research hiking and snowboarding, which I certainly wasn't going to complain about.

I completed my research in Argentina and returned once more to the U.S. National Archives to collect some final data, and then it was time to create a cohesive story out of hundreds of documents. I thought that I would need to rely heavily on secondary sources in order to piece my story together, but once I started compiling everything I realized that I had gathered a great deal of information that wasn't available anywhere in Firestone. It was really exciting to recognize that I had been able to find some truly original sources on my topic, and it made the hours of effort spent researching seem completely worthwhile.

Eventually, after many more hours of organizing all of my research, I completed my thesis. The final conclusions that I reached were not those I expected when I started out, but I was nevertheless satisfied because I felt that I had allowed the story I researched to tell itself, rather than forcing it in a direction that I had hoped it would lead to. As lame as this might sound, I was almost disappointed when I was finally done because I had developed such an attachment to the historical characters I was studying, bizarre as some of them were. I had become totally immersed for over a year in a topic I originally thought I would barely be able to tolerate for a semester, and I think this was one of the most important lessons that I learned. Underclassmen are presented with "The Thesis" in a way that is often incredibly intimidating, but it is probably the first time in your academic career that you will have almost complete freedom to explore your interests in an area of your own choosing. With a bit of creativity and a willingness to take advantage of the resources Princeton offers to up-and-coming thesis writers,
the process can become an incredibly rewarding adventure. I was able to go to a place that I had hoped to visit for many years, while producing a piece of academic work that I am very proud of, and there are few schools that allow such an amazing opportunity.

Angela N. Creager
Professor of History

One of the reasons that it is so much fun to advise senior theses at Princeton is to witness the surprise that students experience in research. In my view, the unexpected nature of historical investigation—the way that old sources, new to us, change our arguments and often our plans—is at the heart of the scholarly enterprise. Senior thesis topics can take off from illuminating seminar readings or startling research encounters.

Although she did not realize it at the time, Erin Blake began working on her senior thesis early in her junior year. That fall I offered a junior seminar in the history department on the theme “Atomic Legacies.” We looked at the origins of the atomic bomb during World War II, and the subsequent establishment of atomic energy agencies and facilities in the U.S., England, Europe, and eventually Latin America and India. We also considered the ways in which politics and popular culture responded to new atomic realities. Best of all, we took a research-oriented field trip. I used funding from a National Science Foundation CAREER grant to take all 10 undergraduates (plus a wonderful graduate student) to the National Archives in College Park, MD, where they did research for two full days on their paper topics, beginning with the papers of the Atomic Energy Commission. Within a day, students had moved beyond sources familiar to me into collections I had never tapped (especially records of the State Department and military agencies), probing finding aids with the terrific archivists there and turning up documents none of us had anticipated finding. Buoyed by two days of intensive archival research, the finale of the trip was equally memorable—we watched “Dr. Strangelove” and “Failsafe” back-to-back on the drive in an amazing lux-bus with an entertainment module, arranged with immaculate care by history’s department manager, Judy Hanson.

Not only did the juniors in my seminar produce outstanding papers for the course, but four of them went on to select senior thesis topics that built in some way on their fall junior independent work. Looking back, Erin’s junior paper was probably closer to a graduate research paper than any other JP I’d read at Princeton. She’d managed to get on top of a complicated literature on foreign relations and atomic energy as it played out in South America. She made marvelous use of unpublished documents to show how the U.S. government’s desire to access uranium and thorium drove the programs
for nuclear assistance and technical exchange with Brazil and Argentina. Some of her account overlapped with what could be found in disparate secondary sources, but she was also breaking new ground. It was clear that she had a knack for historical analysis and was on to something significant! Even so, Erin’s decision to go back to her fall junior paper topic to pursue a senior thesis was not automatic. She was working toward a certificate in African studies, and already planned to write a senior thesis on some aspect of African healing, medicine, or science. But I think she was pulled by the rich source-base she’d uncovered in the archives as she contemplated her senior thesis. In addition, she knew that her command of Spanish would open up documents in that language, providing her with a wonderful research advantage. It is worth noting that Erin maintained her strong interest in Africa, accepting a position in the Princeton in Africa program for the year after she graduated.

When Erin approached me in the spring of her junior year interested in applying for one of the history department’s Stone-Davis fellowships for senior thesis research, I was delighted. She proposed to spend the summer in Argentina, using government archives there to understand the development of the national atomic energy program from the Argentine side. She organized and managed her research trip completely on her own, and recovered a trove of primary source documents for her senior thesis. She also went back to the National Archives in College Park early in her senior year to augment the document base she’d developed as a junior.

In the end, Erin produced a stunning piece of undergraduate research—indeed, I would say it was the most ambitiously researched thesis I’ve had the pleasure of reading in my dozen years here. Her account hinged on a fascinating tale of scientific deception. After World War II, Argentina’s President Juan Péron launched a national atomic energy program, hiring Austrian physicist Ronald Richter, whose secret nuclear research program he lavishly supported. (Péron had first tried unsuccessfully to bring to Argentina the Nobel Prize-winning physicist Werner Heisenberg.) This strategy went against the advice and advocacy of the few prominent Argentine physicists (such as Enrique Gaviola) who proposed to develop atomic energy through human resources, particularly through investing in an infrastructure for education and research. In 1949, Richter moved his program to Huemul Island, where his secretive work went along unchecked for two more years, despite the suspicions of Argentine scientists that he was a fraud. In the meantime, reports that Péron was establishing an atomic energy commission concerned the U.S. State Department as well as governments of other Latin American nations. Then in March 1951, Richter made a public announcement that he had developed an entirely original new process by which a thermonuclear reaction could be unleashed. Skepticism both at home and abroad, and the
lack of any concrete results, led Péron to establish a commission of scientists to inspect Huemul. This group of experts exposed Richter’s fraudulence.

Erin went on to argue that although Richter’s program was an abject failure, it nonetheless helped establish a “platform” on which nuclear energy in Argentina was actually developed. This was in part due to a historical contingency that shortly after the Richter affair was exposed, President Dwight D. Eisenhower launched the “Atoms for Peace” program with its plans for the international dissemination of nuclear technology. On account of Argentina’s uranium reserves, U.S. officials were keen to include Argentina in a program of technical and material exchange. Argentina was a strategically important country with respect to the military and economic objectives that Eisenhower’s critics claimed were the basis of his “peaceful” program. Indeed, as Erin points out, U.S.-Argentine relations went from being strongly antagonistic to providing “a model example of the mutually beneficial type of exchange envisioned by Atoms for Peace.” She argued that the embarrassment of the Huemul project accounted for Péron’s willingness to negotiate with the U.S., a shift in policy with far-reaching consequences.

Not every Princeton senior, or even every history major, will go abroad for thesis research. But I always tell students that the key to a great thesis is not the selection of a good topic or question, but the discovery of wonderful sources. I think that Erin’s success shows that it is worth veering off one’s pre-determined course to pursue a promising lead. Follow your nose and enjoy the process of discovery!
The thesis was often in the back of my mind during my freshman and sophomore years as the quintessential component of my Princeton education, the capstone of my undergraduate career. I envisioned the thesis as an enlightening, eye-opening journey that would reflect the learning and growth of my years at Princeton. When I entered college, I knew neither my major nor my thesis topic. Spanish language and cultures had interested me throughout high school, an interest that deepened as I took classes in Latin American literature, politics, and history. I made the fortuitous decision to study abroad in Santiago, Chile, during the spring of my sophomore year. Without my semester in Chile, I never would have discovered the fascinating music of the nueva canción chilena (the New Chilean Song), a song movement from the 1960s and 1970s that would later become the focus of my thesis.

My host parents introduced me to this previously foreign world of the nueva canción chilena by playing this music in the background during meals and social gatherings. As I listened to these beautiful songs and the stories of my host family, I became interested in the social and political significance of this song movement. After attending an Inti-Illimani concert at the former Estadio Chile, renamed Estadio Víctor Jara, I was further intrigued by the political importance of the nueva canción chilena. Inti-Illimani poignantly recognized Jara’s influence on their artistic formation after referring to his tragic death in the stadium where we were standing. I was struck by the charged political atmosphere of the concert, with audience members jumping up and down as they shouted, “¡El que no salta es Pinochet!” (The one that does not jump is Pinochet). Since a lower court had removed Augusto Pinochet’s immunity in the week prior to this May 2004 concert, the people were optimistic that Pinochet would finally receive the justice he deserved. This political manifestation contributed to my fascination with the link between the political project of Salvador Allende’s Unidad Popular and the music of the nueva canción chilena. I wanted to better understand this connection, its past importance, and the song movement’s continued political relevance over 30 years after the fall of the Unidad Popular.

After I returned to the United States, the nueva canción chilena continued to intrigue me. I listened to the songs of Parra, Jara, and Inti-Illimani as I read more about Chilean history, politics, and culture. I wrote my first junior paper about Chilean short stories written during the period of the dictatorship, a related yet distinct topic. While the song movement remained an interest of mine, it seemed too large to tackle in junior independent work. The music of the period slowly emerged not only as a passion of mine, but also as the lens through which I could analyze the social and political events of a crucial decade in Chile.

During the summer before senior year, I spent three weeks in Santiago doing research, initially reading more books and articles about the nueva
canción chilena and listening to song recordings at the Biblioteca Nacional de Chile. I also visited the Fundación Víctor Jara in Barrio Brasil, where I read the archive materials and looked at the timeline display of articles and photographs. During my short stay in Santiago, I attended my second Inti-Illimani concert, observing the performance techniques employed by a group of the nueva canción chilena and the contemporary reception of this type of music throughout their performance at the Teatro Circus OK. Interviews formed an important component of my field research, including conversations with composer Gabriel Matthey, musicologists Rodrigo Torres Alvarado of the Universidad de Chile and Juan Pablo González of the Pontificia Universidad Católica, philosopher and member of Quilapayún Eduardo Carrasco Pirard, professor in the Instituto de Estética at the Pontificia Universidad Católica Gabriel Castillo Fadic, investigator of indigenous music Carlos Retamal, and self-described “troubadour” Eduardo Peralta.

In addition to this fieldwork, my thesis research focused on the songs themselves. With a limited background in music, I needed to increase my theoretical understanding of music in order to inform my analysis of the songs and my writing of the thesis. The work of Simon Frith was invaluable for this analytical foundation. My theoretical lens was also influenced by the work of Raymond Williams on popular culture, Marxism, and the city-country divide; by Antonio Gramsci’s view of popular culture and folklore in his Selected Cultural Writings, and by Theodor Adorno’s look at the culture industry and popular music. To supplement my analysis of the songs, I read biographies of the musicians, critical assessments of the nueva canción chilena, and other works to contextualize the music in that historic period and to enhance my understanding of the nueva canción chilena, its music, and its political importance.

As I progressed in my research, my vision of the song movement and its political implications became more complex. While I initially intended to focus solely on the lyrics, I realized that the songs and their relation to social and political events could only be understood through a more comprehensive and nuanced analysis of the song movement. My thesis developed into a snapshot of Chilean history between 1965 and 1975 that traces the evolution of the nueva canción chilena from its origins in Violeta Parra’s folkloric investigations and her family’s peña to its near-obliteration when the military coup forced the song into exile or underground. Chronological divisions helped me to separate the nueva canción chilena into three periods using the framework of “non-official” culture and “official” culture: the revolutionary struggle until the victory of Allende in 1970, Allende’s socialist government from 1970 to 1973, and the military dictatorship following the coup on September 11, 1973.

My adviser, Professor Arcadio Díaz-Quiñones, urged me to incorporate additional theoretical perspectives, including the views of popular music from Frith and Gramsci, and a broader historical understanding. He encouraged me, too, to explore the connections between the Cuban revolutionary experience with
Castro and the Chilean path to socialism via the election of Allende. He also pushed me to include more about the nueva trova cubana (the New Cuban Song) and its relation to the nueva canción movement not only in Chile, but throughout Latin America. These suggestions enhanced the depth of my thesis, developing comparisons that had been mentioned in previous literature, but not fully explored. Since I was writing my thesis in English, I was inevitably contributing to the field since only a limited amount of literature on the nueva canción chilena was available in English. I also tried to draw out connections between this Chilean music and the socially conscious folk music of the period in the United States, including artists like Pete Seeger, Arlo Guthrie, Joan Baez, and Bob Dylan. I wanted to provide contextual references in order to make the Chilean music more accessible to readers familiar with the protest and topical songs of the era in the United States.

At times, I experienced frustration with the thesis process. For instance, my adviser challenged my idea to structure my chapters chronologically, suggesting that it might be better to organize my thesis around themes like the voice, the lyrics, and the social movements. I found a way to combine his idea with my chronological vision of the thesis's structure. My analysis focused on the songs' lyrics and other musical components, the social and political importance of this music, and the reciprocal relationship of culture and politics illustrated by the nueva canción chilena and the Unidad Popular. Each chapter dealt with a defined period of time and a particular theoretical issue, allowing for greater analysis than a narrative description of the musical developments in that given span of years. While I eventually discovered a suitable structure for my analysis of the nueva canción chilena, figuring out how to arrange the chapters and connect them without repeating myself in this linking emerged as a great challenge.

Compared to my previous academic writing, the thesis was such a massive endeavor. Since the research and writing stretched out over the entire year, I found it difficult to sustain my interest and passion about the topic 100 percent of the time. While I am still excited about the topic even months after I bound my thesis, there were days when I could not bear to listen to a nueva canción song or to think about writing the next chapter. Yet because I dedicated so much time to this project, I am proud of the outcome. My sentences combined to form paragraphs and chapters that united together as my thesis, a bound work that, in essence, is a book. Seeing my months of work consolidated into this final product was the greatest reward of the thesis process. I enjoyed sharing my thesis with professors, family, and friends; an explanation for why I had disappeared to a certain extent during recent months. I sent one copy to the Fundación Víctor Jara, the archive in Santiago where I did some of my research, so that other English-speaking visitors to the archive would have access to an additional resource. The letter of gratitude I received from the archive helps to validate the process of...
writing a thesis for me. I feel as though at the age of 21, a mere undergraduate, I have contributed to the field of research on the *nueva canción chilena*.

If I were to go back to the fall of my senior year, I would happily embark on the thesis process again. However, I would start writing sooner. I got so involved in the background reading and research that I kept putting off the writing until January. While I had plenty of time to write, I think I would have benefited from writing a little bit on a daily basis, starting in October or November. My research could have been more focused around the questions raised while writing, instead of reading and note-taking without a set purpose. I was afraid to dive into the arduous task of writing, so I prolonged my research. When I look back at the experience of researching and writing my thesis, the process of crafting my own analytical view by combining field research, primary sources, theoretical perspectives, and additional secondary references was the most remarkable. I enjoyed synthesizing my research in order to tell my own account of the *nueva canción chilena*, perhaps an indication that an academic environment may be the right place for me long-term. Regardless of where my future path takes me, I feel lucky to have had the difficult yet rewarding opportunity of writing a thesis under the guidance of a renowned faculty member while I was an undergraduate.

**Arcadio Díaz-Quiñones**

*Emory L. Ford Professor of Spanish*

*Professor of Spanish and Portuguese Languages and Cultures*

For Krista Brune, I believe, the beginning of her thesis was the love of Spanish poetry and the awareness of the power that music and voice have over individuals and groups. There was true passion in her work from the start, an enthusiasm that was engaging and infectious. That is perhaps what I admired the most, and it is apparent in the sensibility and sophistication shown in her thesis. But passion alone is not enough. Krista also demonstrated sustained commitment to her work. It seemed that she had been preparing herself all along, by dint of her native language ability and dedication to her work. Then came the need to research and reconstruct the 1960–1973 period, the years during which the Chilean new song movement took shape and exerted a great deal of influence. The breadth and depth of reading and writing she did for her senior thesis were motivated by a genuine desire to command the tools needed to tackle the fundamental problems. The result is her wonderful thesis.

I think we met about once a week. I do remember that in our first meetings (and Krista really started early) she seemed nervous and perhaps a bit lost. How could she turn her intimate knowledge of the Chilean *nueva canción* that had moved her so deeply into an academic “topic” and a lengthy thesis? Naturally cautious, Krista was unwilling to commit herself until she had mastered the skills
required and the background of the subject. And perhaps I was not very helpful because I insisted on listening to what she was telling me about the singers and the lyrics and did not offer any clear blueprint. But she soon realized that a meaningful thesis is both a personal and an intellectual quest. She never missed a meeting and would always come back with new questions and in search of answers, eager for suggestions of books and articles on related topics that could be useful. It is a measure of Krista’s intelligence and spirit that she not only read intensely in preparation for her writing but that she put that reading to good use. It was a delight to work with her; she picks up leads with great energy and has impressive powers of organization. She rose impressively to the most demanding of challenges, acquiring the necessary conceptual tools to decode the complex chain of references in the music, and establishing the critical distance to allow her to look into contemporary debates on popular-nationalist projects and the tragedy of the military coup and repression of the Pinochet regime. I knew Krista as a dedicated student in my literature courses, but it was really while discussing her drafts and her questions, and seeing her struggle with the writing itself, that I truly discovered her many talents. And I learned from listening to what she had to say. I feel strongly that advising is in large measure the ability to listen to the student’s words, questions, and stories, and not letting respect interfere with the obligation to ask questions.

The issues discussed were, of course, not purely aesthetic. Musical transformations during this era were intimately tied to volatile social and political currents which Krista had studied in her research trips to Chile. Two chapters deal with the origins of the nueva canción, introducing the problems to the reader as well as offering very thoughtful profiles of prominent singers Violeta Parra and Víctor Jara and underlining the importance of the peñas, places which became real workshops where musicians and singers preserved and transformed traditional songs. Krista offers many fine observations on key songs and musicians and the role they played in the reorganization of Chilean cultural life. She also devotes attention to the nueva canción during the campaign that led to the government of the Unidad Popular and Salvador Allende. Krista brings sharply into focus the significance of specific voices, as crucial for the understanding of the nueva canción as the many interviews she conducted in Santiago. One chapter is devoted to the institutionalization of the nueva canción under the Allende government and a final one deals with Pinochet’s coup and its devastating implications. Throughout, she combines intellectual rigor with a mature sense of human values.

I want to underline that Krista’s account is enhanced by her first hand knowledge of Chile and the utopian mood of the nueva canción and how the main actors were shaped by its ethos. While in that country, she drew ... she soon realized that a meaningful thesis is both a personal and an intellectual quest.
upon magazines and journals, inserted herself in local cultural life, and engaged in active dialogue with scholars in the field. The effects were reflected in the writing of the thesis. I remember that toward the end, I suggested that a CD was necessary so that the reader could follow her analysis and interpretation, reading the lyrics and listening to the music. In a few days she produced an admirable anthology, which is now part of her thesis, yet another proof of her rich understanding of her topic. Everything she did was traversed by her personal enthusiasm for poetry and her respect for Chilean culture. Passion and hard work: that would be my advice.
I am multiracial. I see myself as having three racial identities—white, black, and Native American. Yet in most social situations I racially self-identify primarily as black. Why? This seemingly small question was the basis of my thesis. I wanted to explain and understand the process by which multiracial adolescents choose one (or more) racial identity(ies) over another.

As I read research that investigated identity formation among multiracial adolescents, I realized that it was limited in two ways. First, most studies involving multiracials were based on data from a limited number of interviews. The small number of people included in these studies restricted the generalizability of the research conclusions. In addition, race was usually only measured in one context. Thus these studies were unable to examine situational changes in racial identity. While reading these studies on multiracial adolescents I decided to expand my interest in identity formation to include Hispanic adolescents.

My thesis examined self-identification and academic achievement among Hispanic and non-Hispanic multiracial adolescents. I first demonstrated that how one defines “multiracial” has important implications for analysis. I then examined various factors that influence the process of selecting an identity among adolescents. These included race of friends, race of romantic partners, parents’ education, and phenotype, to name a few. Finally, I concluded my paper with an analysis of academic achievement (GPA) among Hispanic and multiracial adolescents by self-identification.

In order to address the limitations of previous research I decided to use data from the National Longitudinal Study of Adolescent Health (Add Health). Add Health is based on a nationally representative sample of adolescents; therefore any results from my analyses would be applicable to the general population. Add Health was also uniquely suited to my question because it collected questionnaire data from adolescents both at home and at school; as a result it allowed me to compare racial identification across contexts. Because Add Health was such a good fit to my research question I was excited to begin my research. As the thesis progressed it became clear that two key decisions were crucial to its success: 1) starting early and 2) choosing a good adviser.

An early start on deciding which data set to use, acquiring approval to use it, and beginning data organization are crucial to thesis success. The earlier the start the better off you will be and the less you will be intimidated by large data sets and the skills you will need to master in order to utilize them. From working with Add Health data I learned that the privilege of working with a data set that was a good fit to my question was worth all the difficulties and challenges I faced. Add Health is an extremely large data set (much larger than I could have anticipated) and very complicated. The data required a lot of cleaning before I could even begin to work with them. In addition, I had to learn Stata, a statistical analysis program, in UNIX in order...
to run my analyses. The task was daunting at first but not that difficult once I started. The results paid off and in the process I learned a skill that is valuable in graduate school.

An early start was also important because I discovered limitations in my data as I continued with my analyses. Some of the influences on identity formation I wanted to explore had to be dropped because of issues with the data. Dropping these variables also entailed changing chapters I had already written as well as reworking tables. At the time it seemed that I would never get through, but along the way I learned not to be afraid of change. I don't think my analysis suffered from the loss of these variables, and reworking my chapters did not take as long as I thought it would. The questions I was unable to answer because of data limitations also provided ideas for future research.

My thesis was an ambitious project because I attempted to tackle so many topics at once. I don't recommend this— it created many headaches when I tried to write my introduction. However, one early decision I made turned what could have been an excruciatingly painful process at best, and a failure at worst, into a success. I chose a wonderful adviser. Choosing your adviser is perhaps, aside from choosing your topic and starting early, one of the most important decisions of the thesis process. There are many ways to pick an adviser, but here are two things to remember: 1) your thesis will reflect your adviser as well as yourself, and 2) pick someone who wants you to succeed. Your work is a product not only of the hours you put into it, but the hours you spend with (or without) your adviser. Feedback is valuable, and your thesis will demonstrate whether or not you had it. A professor who wants you to succeed will be willing to invest incredible amounts of time and energy in you.

Professor Marta Tienda is a great example of a professor who wants her students to succeed. Her expertise and guidance became absolutely crucial to my success. She helped me narrow my analyses to include the tables I needed and nothing more. Her knowledge of the field and ability to recommend relevant reading became essential, especially as my research question changed and I needed to find key authors on various topics. As the final few weeks before the due date drew near, I felt that Professor Tienda was as much invested in the success of my thesis as I was (and that was a great feeling). She invested hours of her time poring over my drafts, tables, and chapters. She read third drafts of some of my work, even taking the time to give me line edits. She was willing to meet me in her office on a Sunday to review needed changes in the final weeks before my thesis was due. She triple and quadruple checked my tables. In short, Professor Tienda went the extra mile for me, and I believe my thesis demonstrates it. If not for her careful supervision, it would not have turned out so well.
Writing a thesis is both a challenge and a blessing. While faced with a looming deadline, it felt very painful, but I learned so much. Retrospectively I realized that picking a topic I was passionate about, starting early, and choosing an adviser who was committed to my success made the process less arduous. I also learned that the thesis is never perfect. Even those who have a month to proofread can still find errors in their manuscripts after they turn them in. What is important is giving your best effort and learning from the process.

Marta Tienda

Maurice P. During Professor in Demographic Studies
Professor of Sociology and Public Affairs

I enjoy thesis advising because I get to know students at a deeper level, coming to understand how they think, how and why they select their thesis topic, and what other activities compete for their time. Helping students budget time for thesis research is an important part of research guidance that artificial deadlines cannot convey. I emphasize that research is a process, not an event, and requires continued dedication to progress from vague topics to more sharply defined questions and hypotheses. Guiding advisees through the discovery of ideas is especially rewarding. Not only can I observe how they evaluate claims and evidence in published research, but I can challenge them to go beyond conventional thinking. I can also help them appreciate that not everything published is scientifically meritorious.

Ruth Hunt Burke is a professor’s student; she has a steep learning curve, but is willing to invest the necessary time to produce the best research. That Ruth was one of the top sociology students of her cohort was evident when she enrolled in the junior year research methods course. This was further confirmed when I read her junior paper, which was an original study of racial classification based on phenotype. In class she was diligent in completing reading and writing assignments. Although she was not in my precept, it was clear that she was on top of course material (she sat close to the front of the classroom). I thought Ruth would make a great undergraduate research assistant, so I invited her to work on my research project during the summer between her junior and senior year. I allowed her to explore my survey data to characterize the multiracial population in Texas and also invited her and the other undergraduate research assistants to attend workshops and project meetings throughout the summer. I also directed her to several sources about racial identity among Hispanics that proved influential in the scope of her thesis.

She mastered several research skills, including higher proficiency in Stata, which she utilized masterfully in writing her senior thesis. I was delighted when she asked me to advise her senior thesis. We were a good match—I
We were a good match—I knew her skills, her passion, and her work habits. She was self-directed and took initiative to arrange meetings during the critical fall period to solicit help acquiring data, tightening the research question, and beginning the literature review.

Ruth selected the best data set for her thesis, but the quality of the data came at the cost of complexity. Undaunted, she worked assiduously, developing a highly nuanced classification of racial identity, replicated the analyses of other scholars (one a former student of mine) who used different data, and argued cogently how her measures and definitions were superior to those used by others. Moreover, she expanded the discussion of biracial identity to Hispanics—a benefit possible because of her summer research experience. And, she illustrated how varying definitions of biracial identity were consequential for measures of academic achievement. What was incredibly satisfying about the empirical work was her demonstrated mastery of selection bias and the profound distortions to statistical inference if left unchecked. I was also gratified to see her reviewing notes from the “Claims and Evidence” class as she worked through the initial idea, translating the topic to questions that could be answered. I classify Ruth’s thesis with some of the best empirical papers produced by graduate students I have taught at Princeton.

My only frustration was the lack of time for revisions of the empirical work. I blame myself, in part, for the time crunch that required re-estimation of most analyses during the trying last week. I underestimated the complexity of the data and the required revisions to complete the empirical analyses. This cut into time allotted for final editorial revisions. But, Ruth managed to complete all revisions and produce a first-rate thesis. My greatest satisfaction is that she is now in graduate school at the University of Pennsylvania, studying with one of my former students, Grace Kao, whose work she improved on in her thesis. In recruiting Ruth to Penn, Grace claimed that she was her “intellectual aunt,” hence she should decline admission offers at Harvard, Stanford, and elsewhere.

To seniors I would note that my most successful advising experiences began early—usually I was approached before the fall semester began. If you have an idea, explore it with possible advisers sooner rather than later. Fall is an important time to translate your ideas to questions and if possible, read Chapter 3 of The Craft of Research. If you don’t have a question, you don’t have a thesis!
Okay, so reading a Princeton publication on how wonderful and life-changing your senior thesis will be before you have any idea what you are doing and are beginning to freak out is not your idea of a good time. I completely understand, but I do believe that what I have to say will help you and soothe some of your hysteria. So take five minutes and read my brief words of wisdom, or “things I wish I knew before I started my thesis.”

(1) It’s okay not to work on your thesis over the summer.

The summer before your senior year is one of your last chances to do whatever you want to do. You are not in any way obligated to spend it working on your thesis, so don’t feel guilty or unproductive doing something else. If you’d rather learn Arabic, intern at a nonprofit, or lifeguard at your local pool, do it. You’ll have plenty of time to work on your thesis during the school year. Only spend the summer on your thesis if you really want to and believe it will help your work.

(2) Sift for gold.

In the fall of my senior year, I was only certain of two things about my thesis: I wanted my JP adviser to become my thesis adviser; and I wanted to continue to deal with the issue of the woman artist. I had several meetings with my adviser in October, bouncing off ideas that didn’t really seem to stick. I mentioned in passing that I was interested in two modern female sculptors, Louise Bourgeois and Eva Hesse. This sparked my adviser’s interest, and suddenly I had “a topic.” I thought that having a topic would somehow be freeing, a sort of “at least I know what I’m doing” feeling. Instead, it felt burdensome. If someone pushed me further on my topic, I realized how completely general and ambiguous it was.

For me, the most difficult part of the thesis routine was going from “topic” to the crux of my thesis. I kept waiting for everything to come together, and for me, that moment really didn’t occur until I finished editing and writing my conclusion. Instead of a single moment of revelation, my thesis was conceived and written through a constant stream of discoveries. During the entire process, from the earliest stages of its development to the final stages of editing, I can locate no single flash of brilliance, no single shriek of “Eureka!” Rather, writing my thesis was like sifting through piles and piles of dirt, looking for just a flash of gold; days could pass mired in dirt, other days the soil seemed to shimmer. The sifting was reading, reading, reading. I read everything and anything I could get my hands on—starting with basic texts, following the footnotes in those texts to other sources, and so on, while also relying on recommendations of my adviser and other members of the department. This hysterical cycle of reading was tempered by reviewing the notes I had taken on these texts, then finding those little nuggets of gold.
Nearly every time I asked for help, people went out of their way to give me as much of their time and energy as they could.

(3) No man is an island.

Your thesis does not solely need to be between your adviser and yourself. I was lucky enough to have an adviser who I really respected and admired, but she was not the only person I went to for guidance. The art and archaeology department ran a thesis-writing workshop that consisted of a graduate student and a group of my peers that was incredibly helpful for feedback and editing. In addition, the graduate students in the department, the librarians at Marquand, my friends, and my family were incredibly helpful throughout the entire process. Princeton is an amazing community, so use it to your advantage. Nearly every time I asked for help, people went out of their way to give me as much of their time and energy as they could.

(4) Get personal.

I never expected my thesis to be the intensely personal and emotional journey that it became. When I discovered that both Bourgeois and Hesse had lost their mothers in their youth as I had, I knew that my thesis would deal primarily with the idea of mothers. This raised the stakes of my thesis—it was no longer simply an intellectual challenge, it was a personal and emotional journey. It was exhausting, it was hard, and it was one of the most rewarding experiences of my life. Coincidentally, my second reader lost her mother around the time she was reading my thesis. She told me that she learned a lot about how to handle her loss from reading my thesis. I have never received a better compliment. I not only learned so much about Bourgeois, Hesse, sculpture, and art history from my thesis, I also learned a lot about who I was and who I wanted to become.

(5) Take care of yourself.

Ultimately, you need to take care of your physical and emotional health. Plan your time so that you can do the things that make you who you are, whether that be going for a long run or spending a night eating pizza and watching bad television. I took four days off during spring break (serious thesis crunch time) to go on my family vacation, and I never regretted it. Getting away from Princeton, seeing my family, and sleeping were exactly what I needed before I hit the home stretch of the thesis process.

Carol M. Armstrong
Doris Stevens Professor in Women’s Studies
Professor of Art and Archaeology

I first got to know Catie when she took a seminar on women artists with me in the fall of her junior year. In that context she wrote the best paper of all the students in the class, on the Dada photomontages of Hannah Höch. I mention this for two reasons: first, because I initially underestimated Catie; and second, because it seems to me her thesis project, the best piece of work by an undergraduate that I have read during my time teaching at
Princeton, grew organically out of that initial paper. Catie's record at Princeton is evidence of the best that a Princeton education can be, when it is undertaken by a student who is as close to my ideal as I can imagine. And Catie is that: neither perfectly groomed and polished, intellectually speaking, nor adept at fitting herself to a pattern-book model, nor complacent in the social and economic privileges accorded her. She was from the start eager, unconventional, curious, and determined to challenge herself beyond what she thought her capacities were; fresh and humorous and creative, with some very interesting rough edges; a real human being who made her intellectual passions personal ones. In my seven years at Princeton I have sometimes thought that the senior thesis was not for everyone. In Catie's case, I think the senior thesis truly was the crowning experience it is supposed to be. Catie marshaled her forces and turned out a mature piece of thought and writing that spoke volumes about the way she had matured as both a person and a thinker while at Princeton.

When I first encountered Catie in the seminar, I was charmed by her, but I confess I had no idea of either her intellectual capabilities, or of her capacity and even appetite for hard work and dedicated attention to a topic. Indeed, part of what was so charming about her was that she had no arrogance and no complacency about her gifts; she seemed distractable and easy-going; she was not always utterly articulate; and she was the opposite of an egghead student—she obviously had much too much life in her, and too much of a life outside of the classroom, for that. But it soon became clear how dedicated she was when she did focus, and how willing she was to take intellectual risks and push the envelope beyond what she felt she had comfortably mastered. By the next semester she was working with me on a junior paper on the photographs and reputation of Diane Arbus, as presented in a current exhibition at the Metropolitan Museum of Art. I insisted then, as before and later, that she choose her topic from her own interests, and I was gratified to see how she responded, and then when I suggested she construct her paper as a long review of that exhibition, I was even more gratified to see how she took that suggestion and ran with it. I was then struck with how diligent and exacting she was with herself, and how determined to think for herself, muddle through problems of interpretation, and come up with original insights into what she was looking at. It is one of my principles that art history students work outward from specific analyses of specific works of art. Catie took that seriously, pursued her treatment of Arbus's peculiar photographs in her own voice, made totally original comparisons between images at the show, and thought hard about the message the exhibition was sending about the artist and about how the hanging of the exhibition structured that message. I was also struck by how much she took all suggestions to heart, but then produced something that was her own work and her own ideas, not mine.

This was precisely the way in which Catie and I proceeded when she turned to her thesis project. Initially Catie was all over the map; she had several very broad ideas about what she wanted to pursue, but couldn't settle down into
one of them. She was worried and apologetic about her indecision in the first few months of her senior year. We met repeatedly, and she kept going back to the drawing board. She knew she wanted to work on the problem of the “woman artist” once again: on some topic that addressed the ways in which an artist’s female sex and gender might or might not inflect her work and the myth that emerged around it. I myself do not have a party line on this question or on ones like it, and I prefer to let students find their own answers to such questions, through their own process of thought, observation, research, and interpretation. Initially that was difficult for Catie. In those first few months I think she might have preferred it if I had simply given her something to work on and told her to go do it. But finally the open-endedness and the initial uncertainty paid off: I remember the conversation in which she had narrowed her field of inquiry to two possible problems and a few artists, and I asked her to work through with me out loud what interested her about each of these problems and these artists. It was thus she herself who came to articulate who and what she wanted to work on and why she wanted to do so. (This is, I believe, the way creative people in the humanities work, possibly in contrast to those who pursue investigations in the sciences, where there is more of a community of research and a cumulative building upon past work to arrive at current research problems.)

In the end Catie chose to work on a comparative study of the sculptural work of two artists indirectly related to one another: the older, long-lived Surrealist-offshoot Louise Bourgeois, and the younger, short-lived Minimalist-generation Eva Hesse. Both artists have received powerful readings by brilliant art historians who have looked at their work through and/or against the lenses of feminist and psychoanalytic theory. Catie wanted to develop her ideas from those existing interpretations, but did not want to simply reproduce them. Moreover, partly because I prodded her away from easy solutions, she was not content with any reductive or dismissive reading of the ways in which Bourgeois’s and Hesse’s works were “gendered.” Nor did either of us want her to equate the two artists with each other. And finally, I urged her to stay connected to the work itself, and not just to theory or iconography or biography.

What Catie ended up with was once again her own, but this time in a much more sustained way. She argued for a differentiated view of each artist’s work vis-à-vis heretofore neglected aspects of Melanie Klein’s interpretation of the “maternal” relation. What was remarkable about the final product—which grew out of multiple drafts, conversations, meetings between Catie and myself (and between Catie and other teachers and preceptors; Catie availed herself of everyone she could)—was not just its sophisticated understanding of the very sophisticated readings that were already out there, but how much it was attuned to the material and corpo-
real specificities of each body of work, and their differences from one another. I am very proud of Catie; she used all of the resources that Princeton has to offer, including close contact with instructors, to turn herself into a serious and seriously creative thinker about art, without losing any of her humanity in the process. But the kudos should go to Catie, and not to me or any of her other interlocuters, or to the institution at which she was educated. She is, in my view, what an ideal student is at Princeton or anywhere else: not a passive, perfectly polished commodity, but an actively responsive participant in the life of thought made available to her.
Did you know that every two seconds, someone in the United States needs blood? You are probably wondering how an operations research and financial engineering major managed to write a senior thesis about blood banking. Most ORFE thesis titles include a lot of finance-related jargon. After entering the department, however, I quickly learned that I was more interested in operations research than in financial engineering. I therefore managed to avoid the “Introduction to Financial Engineering” class and to enroll instead in “Introduction to Dynamic Programming,” which is where my thesis journey really began. This class introduced me to the incredible power of the optimization solving methods with regard to physical resources. Many of the mathematical techniques and modeling strategies used in this course are identical to those used for financial resources, but I was instantly intrigued by the vast number of problems involving physical resources, such as freight transportation networks, the fractional jet ownership industry, or even the game “Connect Four” that could be addressed with the material I had learned in my ORFE classes.

This class also introduced me to my thesis adviser, Professor Warren Powell. He opened up new areas of investigation to me, highlighting many interesting optimization problems involving something other than money. I found his application of the optimization techniques to be quite complex and interesting, and also more tangible than many of the financial applications. Therefore, I knew that I wanted to write my senior thesis about some aspect of physical resource optimization. When I fulfilled my distribution requirements, I had taken a class in the molecular biology department as well as a writing seminar, “Medical Narratives.” My interest in biology and healthcare thus eventually led me to my senior thesis topic: blood banking. I’d like to stress the word “eventually.” Don’t panic if you step onto campus in the fall of your senior year with no ideas for your thesis. I was one of those people who initially had no idea about what my thesis topic would be. It is definitely important to find a topic that is of particular interest to you. Just make sure you meet with your adviser and start brainstorming ideas early in your senior year.

Now why choose a thesis topic about blood banking, you might ask? After reading some articles online and researching the American Red Cross and the American Association of Blood Banks websites, I realized that blood is quite a complex resource, and I began to recognize that modeling the supply of blood from donor to blood center to hospital to patient could prove extremely interesting for several reasons. First, blood is a perishable resource, usable for only 42 days after donation. Additionally, eight blood types exist depending on the antigens and antibodies present in the blood. Thus a complex substitution pattern exists for filling transfusion demands with different donor blood types. Also, unlike many supply and demand scenarios where demand is the only random variable, blood banking involves
an additional complication—the supply of blood is also an uncertain process since blood cannot be created or manufactured in fixed quantities (although blood substitutes are currently under research).

My thesis adviser’s excitement regarding the particulars of blood banking gave me confidence that this topic could produce some interesting models and hopefully some significant conclusions. I spent the remainder of the fall researching the biology of blood, the operations of blood banks, and the current issues facing the blood banking industry. I found the blood banking process to be so interesting that I probably spent a little bit too much time that fall researching and not enough time building my model. However, I did start the spring with a solid understanding of blood and blood banking centers, which allowed me to develop a more realistic model to address the frequent shortage problems faced by blood centers across the country.

As you will discover during your senior year, the thesis really is a complex process, a mixture of research, analysis, writing, editing, re-editing, and formatting. For many ORFE majors, there is also formulating a model, writing code, running code, analyzing, and organizing results. During the fall of senior year, the thought of tackling all of these tasks seemed quite daunting, to say the least. However, Professor Powell gave me valuable advice that you may find useful: Keep moving forward on whatever aspect you feel like attacking at the time, but keep making progress. If you feel stuck on your research, start writing your introductory chapters. If you suddenly are inspired by a new argument or a new model formulation, use your time to develop those ideas. Just keep chugging away and you’ll be surprised at how all the pieces come together.

While the senior thesis definitely validated to me that I was capable of creating an innovative research project with interesting and substantial results, it also opened up many new doors for me. My research process began with the usual Internet and book research, but I found that written material on the inner workings of blood centers was lacking. I therefore chose to make some phone calls to blood center managers and others in the various blood banking institutions, albeit with low expectations of responses. I was extremely surprised by the replies I received. Throughout the spring and fall, I was able to speak with representatives from the American Association of Blood Banks, the American Red Cross, the Blood Center of New Jersey, the National Blood Exchange, and the Armed Services Blood Program. The interaction with professionals in the blood industry was one of the most valuable parts of my senior thesis, as these people provided insights not attainable through literature. I would encourage all seniors to reach out to people in their research field. I found the people I contacted to be exceptionally responsive, helpful, and interested in my research.

After such a positive research experience, I began to tackle my biggest obstacle—formulating a model. I had delved into the intricacies of actual blood bank management, but I faced the overwhelming task of simplifying and focusing the scope of all my research into an elegant yet reasonably realistic model.
that optimized shipment decisions throughout the blood supply chain. This was much easier said than done. Another piece of advice—do not hesitate to reach out to your thesis adviser when you are stuck. They routinely deal with the subject matter as well as research problems and thus have some effective hints. Professor Powell was incredibly helpful in guiding me through this process, providing insight on how best to tweak my model and also leading me to important questions and issues to explore. After some late nights and an entire spring break in the basement of the Friend Center, my code was up and running and I finally felt confident in some of the results generated. Seeing significant results after so much research and work was incredibly satisfying and was probably one of the most rewarding and exciting times for me while working on my thesis.

After seeing the results, I felt an enormous sense of relief. I was finally looking at meaningful, interesting, and significant results. What else was left for me to do? I had graphs, I had charts, and I had tables. This meant that I was basically done, right? Well, not quite yet. Do not underestimate the time it takes to compile the diagrams and statistics into writing. This process will probably take longer than you expect. I began to realize that my graphs and data made perfect sense to me after many months studying the topic, but concisely highlighting the important features of my results to the reader was another matter altogether.

Another piece of advice—make sure that you leave enough time for formatting. As Professor Powell consistently tells his advisees, your thesis must pass the "flip test." After a year of hard work and research, these final touches can make an enormous difference in how your thesis is perceived. Also, in my case, the only person actually reading my thesis was probably Professor Powell. As supportive as my family and friends were, I am pretty sure that none of them spent more than 10 minutes flipping through my thesis. Additionally, formatting can be a welcome break at the end of such a long process, and leaving enough time can help avoid panic if any unforeseen formatting issues arise.

Even with all the advice you receive on writing your thesis, it is likely that many parts of your experience will be a struggle. It is a long and complicated process, and I will not lie—I faltered and struggled many times during my senior year. My experience was far from smooth, so do not be discouraged if you feel overwhelmed or lost. Coming up with innovative research and analysis and then compiling it all into a coherent document can be quite overwhelming at the outset. However, the senior thesis does provide you with opportunities unlike any classroom assignment. So, take advantage of the chance to explore an area of interest to you, to reach out to knowledgeable people in the field, and to work closely with a faculty member who has expertise in your area of study. But remember to enjoy your senior year along the way!

If you suddenly are inspired by a new argument or a new model formulation, use your time to develop those ideas.
A few years ago, I started teaching a course on approximate dynamic programming that introduces students to a set of methods for making decisions under uncertainty. I told all the juniors in the class that I would agree to supervise their senior theses if they chose a topic that used the tools I presented in the course.

In my first meeting with Lindsey, I had prepared several ideas for problems that she could work on, drawing from years of experience and a vast array of applications I had compiled. However, as I started to describe some of these ideas, she broke in and suggested the idea of managing blood inventories.

What a wonderful topic!

The idea had not even occurred to me, and yet it was perfect. Timely, relevant, just enough richness to make the problem interesting without being overly complicated. I have always enjoyed sharing my insights with students, but despite the depth of my understanding of my field, I have never been able to compete with the diversity of perspectives that the students bring to a problem. I have never worked in the domain of health applications, and this problem simply would not have occurred to me. And yet once she posed it, I realized it was the perfect application.

The blood management problem seems simple. There are eight blood types, but blood can only be stored for six weeks. By modeling the problem in one-week increments, there were, effectively, 48 blood type and age combinations. In any given week, we have what is, for an ORFE major, a relatively simple linear programming problem. Some blood types substitute for each other. For example, O- blood can be donated to anyone (the universal donor) while patients with AB+ blood can accept blood from anyone (the universal recipient). In between are blood types such as B+ that can only be used by patients with B+ blood (or AB+).

The challenge was balancing the needs of patients now against uncertain demands (and supplies) in the future. Each week, total donations of each blood type, as well as demands, are quite random. Should we use O- blood now for a patient with AB- blood, or hold it for the future? Is it better to use newly donated B+ blood for a B+ patient now, or to use some B- blood that is about to expire?

I was able to quickly outline the basic model and solution approach, but Lindsey carefully researched the physics of blood management. She contacted someone who understood the blood management system in the U.S. and could provide data for a hospital. Based on this research, she developed a model and implemented the algorithms, successfully showing...
that by taking into account the future consequences of decisions made now, she could stabilize inventories and dramatically reduce the most severe shortages.

Lindsey’s thesis was elegantly written with experiments that brought out the important dimensions of the problem. At my invitation, she presented the thesis the following year in my dynamic programming course where I had already made the problem available as a course project (which several students had selected). The problem is now featured in a book I am writing on approximate dynamic programming, and I have already used it in a tutorial I have given on the topic. All this for a problem that would never have occurred to me.
My thesis by the numbers:
Number of pages: 182
Total [neglected job-searching] hours invested: 1,000+
Number of near-mental-breakdowns: 2
Total overdue library fines during senior year: $60 (related to previous)
Number of people involved: Dozens
Total satisfaction on due date: Priceless

How can one convey Princeton's most formidable rite of passage—a veritable institution in itself—through the words of a single personal experience? Is it really possible to recount the feelings of restlessness after redrafting a thesis statement more than a dozen times, or the absolute joy of submitting a massive work that both challenged and expanded my intellectual and creative abilities? I hope that this narrative will provide the future generation of Princeton's brilliant scholars with insight into one way of approaching the senior thesis.

Essentially, my thesis project began during a sophomore year “brain-storming session” with a fellow student on how best to integrate my four certificates (political economy, finance, German language, and music performance) into a single topic. The result was streamlined from the political-economic dynamics of Germany’s music conservatories to the politics of German higher education. I was fascinated by how Germany’s university system, once renowned as the world’s supreme model, became dysfunctional and remained stuck in the status quo throughout the 20th century. From a political perspective, German higher education is particularly salient because it is almost entirely funded and administered by Germany’s state and federal governments.

After initial research during the summer after my sophomore year, I arrived at my junior seminar on comparative political economics with two possible junior paper topics. The first related to the similarities between Japanese corporate and political governance, and the second was an exploration of the German university system from the early 19th-century Humboldtian tradition to the present. My professor, Andrea Vindigni, a native of Turin, Italy, who was more familiar with the higher education systems of continental Europe than of Japanese keiretsu, recommended that I opt for my second idea. And such was the beginning of my two-year foray into Germany’s deeply troubled and highly politicized system of higher education.

My fall junior paper, “The Obsolescence of the Humboldtian System and Dominance of the State Control Model in the Post-1930 University Education System of West Germany,” offered a broad overview of the Humboldtian research university, a 19th-century institution that emphasized the union of teaching and research and that established an international archetype...
for numerous elite universities, including American institutions. In hindsight, my JP experience was a supremely gratifying endeavor, as I acquired a broad sense of my topic that was necessary and instructive to serve as the backdrop for my thesis. However, the junior paper’s wide scope was precisely its greatest flaw. I spent the rest of my junior year scrutinizing my junior paper until I was left with the system’s 200-year history with only some theoretical glue to connect the historical dots. Such information, however, would be insufficient to lay the foundations for my senior thesis; it was my academic responsibility to unearth a rigorous theoretical explanation for the trials of the system’s history.

With this in mind, I applied for funding to go where none of Firestone’s books could take me: inside the German government, where the university system’s most recent and controversial issues were addressed on a daily basis. The politics department graciously awarded me a grant, the Carolyn Picard Thesis Prize, to fund my research during the summer before my senior year. I immediately consulted the Princeton alumni network to find a link to the German government. By April of my junior year, I had my entire summer research project planned out: one month at Berlin’s Federal Ministry of Education and Research and one month at Rheinland-Pfalz’s Ministry of Science, Higher Education, Research, and Culture.

My two internships were formative learning experiences. I was actually conducting research by firsthand observation of the deliberative processes in the government. Interviews with university administrators and high-ranking government officials provided me with incomparable insight into the workings of the university system. I even had the opportunity to meet Germany’s minister of education at a party celebrating the 100th anniversary of Einstein’s theory of relativity! Although my two months abroad proved a linguistic challenge, since I began learning German in my sophomore year, the knowledge that I was able to overcome such a barrier provided me with the confidence that writing my thesis in English would be a cinch.

So, back I went to Princeton with an entire suitcase full of government documents and summer research materials, ready to tackle my thesis and to work again with my superb adviser, Professor Vindigni. But things didn’t materialize as simply as planned. Perhaps it was the five classes I was taking that fall or the Brahms Violin Concerto I played with the Princeton University Orchestra in December that hindered my progress. Or maybe it was simply the vast wealth of information that I had in my room that needed to be sorted out and made sense of.

By November of my senior year, I still did not have a coherent or concise thesis statement, which was made apparent to me when Professor Ezra Suleiman, the world’s authority on European bureaucracy, asked me to describe my project in a single sentence. At that point, I realized that my thesis work needed a focus; indeed, the thesis is the answer to a specific question
relating to a specific topic. From that day on, I arrived at Professor Vindigni’s office every week with new ideas on how to integrate the university system’s history into my own theory of why the system was unable to achieve the enduring reform that it so desperately needed. At each of these meetings, Professor Vindigni would assist me by critiquing and building my theoretical analysis until it accounted for the last two centuries of the system’s history.

Finally, during intersession, I drafted a comprehensive thesis statement that fundamentally remained the same until the end: the three critical determinants of successful reform are the consolidation of reform authority at one level of government; the strength and cohesion of the professoriate; and the presence of an exogenous shock acting as an impetus to reform. From that point onwards, my task was to structure the paper accordingly and to filter out the irrelevant material in order to produce a concise and coherent argument.

But the “onwards” part of my journey wasn’t the end; in fact, it was the beginning of the most physically and intellectually demanding period of my Princeton career. Looking back, it is quite interesting to reflect upon how much your thesis changes during those last two months (even for someone who started two years early) and how much your life changes with it. A traditionally disciplined sleeper, I found that 2 a.m. jaunts to the ‘Wa were as frequent as having to change meal topics when the “T-word” was insinuated; recordings of Vivaldi and Mozart concertos became my constant companions; and dinners with my younger brother, David ’08, became my primary source of comic relief. But with this intense discipline of learning, I always knew that the end was in sight, and that every person who was part of my journey would be there at every step of the way, cheering me on as I sprinted to the finish line. Professor Vindigni remained, as always, a wonderful source of advice and support, having read every page of the numerous outlines and drafts that I produced. My family was there too, though admittedly not as interested in German education, having proofread various drafts and ensuring that my grammatical mistakes would not go overlooked. So too were my professors, preceptors, and best friends. Getting to April 10 was not only a personal triumph and the conclusion of a thrilling international adventure. It was also a testament to the amazing experiences and people I have met along the way.

In closing, I leave you with a few words of advice that were passed down to me from my older brother, Sean ’03—modified from my own experience—and that I hope you will find useful in your own expedition to overcome what is surely Princeton’s Mount Everest. I wish you the best of luck and lots of fun in what will be the most rewarding and interesting project of your life!

1. Choose your adviser wisely. I cannot stress how important it is to work with an adviser you feel comfortable with, who has a serious interest
in your project, and who has the time of day for you. It was such a relief knowing that I could stop by Professor Vindigni’s office for feedback or for a casual conversation about recent political developments that were not directly related to my topic on a moment’s notice. Yes, we’ve all heard the horror stories of advisers who went “missing” for weeks on end: that’s why it’s critical to spend less time trying to contact your adviser and more time thinking about how to improve your project. While the thesis is an “independent” work, every scholar’s work, including (and especially) our professors’, depends on the feedback from peers and mentors. Your thesis adviser is really your academic guardian angel, so choose one who willingly invests time into your project.

2. Plan ahead. I am a huge advocate of careful planning and not leaving topic-picking or writing to the last minute. You’d be surprised how many unexpected events pop up during senior year that will inevitably take time away from your thesis allowance. Surely, you cannot predict when the screenlight of your laptop will blow out (as did mine two weeks after submission), but having a time frame for your outline and subsequent drafts actually allows you more freedom to take the most advantage of your senior year. Using your junior paper as the groundwork for your thesis is a great way to help you plan ahead and allow you to produce a thesis into which you’ve invested sufficient time and energy. Who knows? Maybe your thesis will transport you to another part of the world. I am certain that without having written my junior paper on the same topic, writing my summer funding proposal and the subsequent opportunity to do research abroad would have been exponentially more difficult.

Furthermore, the senior thesis for a student can be likened to the decathlon for a seasoned athlete: both in stamina and scale, it requires the application of everything you’ve learned from previous endeavors, and then some. Try to integrate as much of your education as possible, both technically and topically. While this may sound like the world’s most ubiquitous truism, the more you put into your thesis, the more you will get out of it. The thesis merits and requires complete attention, as it should be a drawn-out process rather than a two-week writing frenzy.

3. Involve as many people as you can find. You’d be surprised by how many people actually volunteered their time and support in the seemingly banal topic of German education. The great thing about Princeton is the sheer number of brilliant and selfless people who are genuinely interested in what undergraduates do. Even if your topic is obscure, ask around for readers. I guarantee that more than a handful would love to help.

4. Take risks. No, not the kind that involves a plane and a parachute. The academic kind, where you challenge traditional postulations of your topic and you allow yourself to explore what you want to explore. Who cares if your thesis topic has nothing to do with your investment-banking career aspira-
tions? The thesis is one of the few life experiences that enables us to delve into topics that we will never have the opportunity work on in the future. There’s always time to read and write about “practical” issues. Trust me: the more scholarly risks you take, the more intellectually gratified and well-rounded you become.

Andrea Vindigni
Assistant Professor of Politics

The truly outstanding senior thesis that Lauren Sarah Carpenter submitted this past spring is the culmination of a broader research project that Lauren actually started at the beginning of her junior year, with the writing of her fall junior paper.

I closely followed the entire development of this project, from its gestation to its completion in Lauren’s thesis, always in the capacity of her adviser. Actually, during the last academic year, I worked with Lauren also in the guise of her instructor in a lecture course. Thus, I have followed quite closely the progress of her undergraduate education (and in particular of her training in the field I specialize in, political economy), as well as of her own research.

The leit motiv of Lauren’s research, both during her junior and senior year, has been the political economy of higher education in Germany. In her junior paper, Lauren described the transformation of the German university during the 19th and 20th centuries. In her senior thesis, she has explored the pressing question of the political viability of educational reforms in Germany, paying special attention to the role of the professoriate and of the administration, as well as to the role of developments in the European Union at large. Perhaps the single most remarkable achievement in Lauren’s thesis is the mastery of the analytical tools and interpretative categories of modern political economy that the work demonstrates. Indeed, the constant tension in the thesis is toward explaining political and economic outcomes in terms of the particular, self-conscious interests of the actors involved, whether individuals, social groups, or organizations, and given the constraints posed by the existing political institutions.

I would say that the experience I have had in supervising the thesis of Lauren (and of a few other Princeton students that I have had the pleasure to advise) is quite comparable to the teaching experience I have had at Princeton, particularly in the course of comparative political economy, which I have offered since I moved to the University two years ago. In my comparative political economy lectures, as well as in the supervision of my thesis students (especially the most motivated and promising), I always try to raise questions and to stimulate independent and critical thought. Hardly any student that I have had has been more receptive of my stimuli than Lauren.

The supervision of Lauren’s thesis has been a continuously enriching experience for me, both intellectually and personally. If I had to single out two reasons
in particular why, out of the very many I can think of, I would mention the privilege of having contributed to shape the thought and the intellectual growth of an exceptional young woman such as Lauren, as well as the huge amount of knowledge and wisdom that Lauren has herself transmitted to me. Indeed, I have to say that my own current research, which focuses on the political economy of bureaucracies, is benefiting quite a lot from the many discussions I have had with Lauren on this topic, which figures at the core of her thesis.

Perhaps, the only difficulty that I have encountered while supervising Lauren's work, has been to be able to find the right amount of time, in my very busy schedule as a junior faculty member, to dedicate to her passionate research work. Thinking in retrospect, I wish I had been able to give to the supervision of Lauren's research even more time than I did.

I have some very general advice for future thesis writers. The writing of a senior thesis should be the culmination of a Princeton education in the broadest sense. It should ideally synthesize a student's learning experience, in terms both of the substantive topic addressed and the methodologies adopted. Hence, it is most appropriate to begin thinking about a thesis topic toward the end of the junior year, but not necessarily much earlier. It may also be a very good idea to write a thesis as development of junior paper research. For instance, the thesis may present and discuss much more broad empirical evidence (possibly based on fieldwork of the student) corroborating a theoretical proposition already established. Or it may present some more original, general, and articulated theorizing on a topic preliminarily explored in a junior paper.
At first my thesis was going to be a collection of short stories, each centered on a different California religious group. I received the English department’s A. Scott Berg fellowship to spend the summer before my senior year doing research on religion in Orange County, California, where I’m from. My idea was to explore a variety of traditions and communities—focusing especially on what I saw as the cult-like, the peripheral, and “the fringe.” When I began my research, though, I felt tugged in an unexpected direction. I was transfixed by Saddleback Church, a mega-church whose membership numbers in the thousands and whose head pastor, Rick Warren, is the author of the best-selling book The Purpose-Driven Life. Saddleback Church is nondenominational, but tends to follow in the mainstream Southern Baptist tradition. So much for “the fringe.” Part of what ended up drawing me in to Saddleback was my sense that it had been omnipresent in my peripheral vision—and in the back of my mind—for a long time, without my knowing it. Once I started paying attention, I seemed to see enthusiastic Saddleback bumper stickers or license plate frames on every car I passed on the road, and I found out that everyone from my neighbor down the street to my dental hygienist were members.

When I began participating in services and events I was at once alienated and caught off-guard by the powerful, absorptive effect the church had on me. Nevertheless I built up an arsenal of observations that I now realized I intended to deploy satirically in my writing. I smugly noted down the tacky hula-party and the photo-op baptisms in the aquamarine pools beside Saddleback’s main building, its “worship center.” I recorded with relish the endless acronyms the ministers used to outline the path to a connection with God, and I smiled internally at the rock-concert atmosphere the church tried to create in special services designed to appeal to youth. At the same time, I gradually became aware that at least once in each service I had the uncanny feeling that the pastor was speaking directly to me—that he had seen into my mind and read it more clearly than I was able to myself. I began to feel that the church was reaching out to me personally, that it had depths and mysteries I would never be able to fathom unless I let down my guard and allowed it to implicate me. I realized that I wanted to write something that would capture the intertwined gulfs and intimacies that made up my sense of the church; I was excited about imagining the worlds and the lives it suggested to me, and about figuring out how to narrate them in a way that would do them justice. I was captivated in such a way that none of the other topics I’d planned on looking into stood a chance, and I decided that I wanted my collection of short stories to be a novel instead.

This is a long way of saying that my research process led me in an unexpected direction. I am grateful that it did, and I think it taught me a valuable lesson about the way that being sensitive to my subject can mean continually allowing my perspective to shift, and my approach to be fluid.
and flexible. I certainly felt frustrated a lot that summer (and throughout senior year, for that matter!). I was often confused about what I was doing and thinking. Now I think my moments of frustration and confusion are probably indications of just how much my thinking and my imagination were evolving and expanding. I would advise students beginning work on their theses not to panic if they feel lost, or realize that their work isn’t taking them in the direction they expected it would. The best way I found to deal with these problems was to make a commitment to daily work. Writing my thesis slowly and steadily over the course of the year allowed me to experiment—some experiments didn’t turn out the way I’d hoped, but I can see now in hindsight that those “failed” experiments were the sites of much of my learning. My thesis experience was not a linear one; my writing process often twisted around and doubled back on itself. I now realize that the twisting around and doubling back were what it meant to move forward.

Throughout the process my adviser, Professor Chang-rae Lee, reminded me to focus on writing a narrative I would want to experience as a reader. Early on, he pointed out to me that I had begun writing in a distant, pseudo-Biblical mode that wasn’t going to let me narrate the way I wanted and needed to narrate. As I wrote, I was often overly concerned with my characters’ spiritual lives in a way that flattened them out and left them opaque; he encouraged me to discover and focus on their full humanity. Sometimes I got so obsessed with the language and atmosphere of the story I was telling that the plot lagged—or even disappeared altogether—and I think most of the advice Professor Lee gave me over the course of the year dealt with drawing out the movement and narrative arc my novel needed. Professor Lee was sensitive to the ways in which creative work cannot always happen according to a rigid timetable, and he encouraged me to resist the urge to finish certain sections of my thesis just because I felt anxious about finishing them at a given time. Looking back on it, I can see that he supported me in subtle and sometimes contradictory ways, always striving to help me write as well as I could. He soothed my anxieties about my progress and helped me to stop thinking about my writing process in too structured a way. At the same time, he helped me bring more structure to the shape of my narrative. He encouraged me to think in terms of chapter-length sections as I wrote, and to figure out exactly how my four main characters would share the space of the narrative. Was my story centered around one character, Pastor Phil Holladay, or was it really meant to be an ensemble piece whose center would be shared by several characters? I’m still not sure. In this and many other ways my thesis continues to be a postgraduate learning experience, thanks to my adviser’s guidance and insight. Now that several months have passed since graduation, it seems incredible to me that I had the kind of access to Professor Lee that I did. He approached my work with a level of

My thesis experience was not a linear one; my writing process often twisted around and doubled back on itself. I now realize that the twisting around and doubling back were what it meant to move forward.
attention and sense of craftsmanship that were instructive to me as a reader and editor, as well as a writer.

Writing my thesis was completely unlike any other academic experience I had at Princeton. In the spring—when it was getting close to time to turn it in—there were moments where I would scroll through the pages I'd written on my computer and find it hard to believe that I had really produced them all. Writing a thesis isn't so different from writing a paper in many ways, but its length does set it apart in ways that surprised me. In March, when I read through the pages I'd done in August, they seemed like they had been written by a different person. By the end of the year the short papers I wrote for my classes felt like little puffs of smoke. And most of all, the length of my thesis meant that its narrative had to be at once more wide-ranging and more tightly interwoven than anything I'd written before. I don't mean to scare anybody as they start their theses, but I'd be lying if I said that my thesis was more or less like any other writing assignment I had at Princeton. With that in mind, I think it doesn't make sense to expect that writing your thesis will feel easy, obvious, natural, or even something that you feel ready for, at least at first. I wish now that I had tried not to think of my thesis as a kind of summation of my college career, in which I would showcase what I had learned and demonstrate a degree of mastery—in other words, as something like a really long final exam. Instead, I wish I had tried to think of it as a culmination of the learning and exploration I got to do at Princeton. Beyond the critical and scholarly techniques we learn, beyond even the substantive knowledge we acquire, in our four years at Princeton we learn to think boldly and to approach scholarship and art with experimentation and invention. I encourage you to approach your thesis in that spirit of boldness and inventiveness; you have never written a thesis before, and producing yours will be your way of learning how.
It was a beautifully written novel, with clear-eyed and pointed observations of the culture of a modern mega-ministry... I found it a stunningly wise work...

interest) would be a wonderful candidate to write a creative thesis.

In subsequent classes I saw her continual development, noting her progress and maturation as a writer, but it was during this past year as her thesis adviser, in regular one-on-one discussions in my office about her work and other studies, that I came to know other sides of her. Both the leisurely and sustained manner of our meetings made for a more freewheeling style of talk, the sessions more like conversations about writing than any pedagogical practice, and I think that’s what’s so wonderful about doing a thesis at Princeton, and particularly a creative one. This was certainly the case with Mimi; our interaction was distinctly not about a transfer of knowledge, but rather more like a series of chats between two practitioners, who, if of differing degrees of experience in the craft, had a shared passion for the process and work.

Her thesis project, a novel about a Christian mega-church in Southern California and its community of spiritual leaders and acolytes, was immensely successful. It was a beautifully written novel, with clear-eyed and pointed observations of the culture of a modern mega-ministry, peopled with finely etched characters searching for meaning and indeed passion, of every religious and secular variety; I found it a stunningly wise work that revealed the depth of Mimi’s interrogation of her themes and players, as well as the contours of her widening vision as an artist.

This is exactly what one hopes for, as an adviser to a thesis, that the project and experience of fashioning the project is a commencement of a newly matured stance, a different positioning between maker and object. In this sense it was a delight to work with Mimi, who clearly possessed what I see as a writer’s conviction, a deepened sense of dedication to not only her particular project but to her art. And it’s this exactly that writing a senior thesis can ideally provide, namely, a singular opportunity to take a measure of oneself, intellectually, artistically in this case, and indeed, almost spiritually.
As you seek advice on your senior thesis, you will repeatedly hear that one cannot fully appreciate the experience of writing a senior thesis until there are many months and miles between you and it. It’s true; only now, having left Princeton, moved across the world, and begun a new job teaching English in Taiwan, can I evaluate my experience.

From start to finish, writing my senior thesis was terrifying. Perhaps this is not an objective evaluation, but it is an honest one. From conception to gestation to delivery to my department office, the fear of giving birth to an unreadable monstrosity led me, like so many Princeton seniors, to feel that my thesis was not a paper, but a child. I was worried that my thesis would grow up to be stupid; that it would not say anything interesting. My terror was heightened by the realization that, despite my painstaking research and the many hours spent willing words to bend themselves to my purpose, I still did not have complete control over my own creation. Perhaps a more apt metaphor than childbirth is the creation of a Frankenstein monster: as much as my thesis was my brainchild, at times it seemed to have a will of its own. Until the end, I was never entirely sure where my thesis was going.

This is my advice to you: it’s okay not to know.

In the process of writing my thesis, I rediscovered the simultaneous joy and terror of questioning the world, and I urge every Princeton senior to do the same. Not very long ago, we were all the kind of children who pestered our parents with impossible questions. Why is the sky blue? Why does grass grow up? Are we there yet? In childhood innocence, not knowing the answers made life all the more interesting. Then some of us grew up into the type of college student who likes to have complete control over life. Others grew up into the type who always has all the answers. In my experience, the process of writing my thesis brought out these Jekyll-and-Hyde aspects of my personality in full force. You cannot write a good thesis without letting impossible questions lead the way, but at the same time, doing so requires you to relinquish some of the control necessary for sanity. I felt that as the author of the thesis, I should be the one calling the shots; however, I found myself continually led by questions without the certainty of answers.

Before my thesis adviser, Professor Perry Link, was my thesis adviser, he told me that the most important part of research is asking questions. This may sound like nothing more than a statement of the obvious, but you will soon find out how strong the temptation of beginning your thesis writing process with a grand thesis statement really is. It is easy to do research when you know exactly what you’re out to prove, but it is much more rewarding to start with a good question and connect the dots as you go.

For my thesis, I chose to expand upon my spring junior paper on a Chinese play from the 1980s, *The Bus Stop*, and its thematic ties to earlier modern Chinese fiction. I knew that I wanted to expand my research to
include even more recent drama than *The Bus Stop* and to delve into the subtleties of the current creative environment in China. I wanted to know what boundaries contemporary drama was pushing and why. In particular, I was intrigued by the idea of censorship: What exactly could theater artists slip by the Chinese government’s censors, if anything? What, if anything, were they hiding beneath layers of seemingly superficial humor? How did contemporary drama relate to the larger questions inherent in contemporary Chinese society?

To begin my research, I practiced asking these questions in Chinese. I received funding from Dean Richard Williams to attend Chinese plays and interview avant-garde directors during my summer studying Chinese at Princeton in Beijing. I was disappointed to find that the answer to my question, "Who are the most important Chinese playwrights of the past few decades?" was often a reluctant acknowledgement that not much worthwhile drama had been produced recently. Over and over, I came across two names: Gao Xingjian, author of *The Bus Stop*, and Guo Shixing, author of a much more recent, controversial play entitled *Toilet*. I returned to Princeton convinced that these two playwrights would be the focus of my thesis and that I could, somehow, find connections among their works.

My adviser’s reaction was supportive, but skeptical. He warned me that there might not be enough beneath the surface of *Toilet* for a solid thesis. Were I in his place, I think that my advice would be just as cautionary. After all, what would you say if a student proposed to make a play called *Toilet* the cornerstone of her thesis? Despite the possibility that *Toilet* was nothing more than open vulgarity posing as “art,” I was convinced that there was more to it than potty humor.

My side-by-side examination of *The Bus Stop* and *Toilet*, two very different dramas from two very different decades, led me to ponder the unique place of drama in Chinese society. Spoken drama, what we commonly think of as plays, did not have a strong presence in Chinese society until the beginning of the 20th century. In fact, the first spoken drama performed in China was an adapted version of the American novel *Uncle Tom’s Cabin*. Subsequently, both the communist and the nationalist parties appropriated various types of performing arts, including spoken drama, as propaganda tools. I felt that this appropriation of drama, combined with the communist party’s history of strict censorship and authors’ self-censorship, had perhaps contributed to a loss of legitimacy for the art form. In this light, *Toilet*’s rude jokes were not simply vulgarity, but mockery of an art form and the cultural value placed in it.

But was I just being stubborn and pursuing phantom connections? Until the last few drafts, Professor Link remained concerned about whether or not all my research questions and answers would coalesce into a coherent
thesis. Would the dots that I was connecting turn out to be a complete picture, or just a mess of intersecting lines?

This brings me to another piece of advice: advisers are an amazing resource. Listen to their advice. But always remember to follow your own instincts.

The puzzle pieces of your thesis will not always fall into place of their own accord. Sometimes, it will seem as though you are flailing about blindly in a bottomless sea of research possibilities. At others, it will seem like you have reached a dead end. When your questioning starts to seem endless and without hope of resolution, remember that you have an adviser who is there to help. Having a great adviser is what frees you to really push the boundaries of your ideas; there is always someone there to catch you if you fall off the edge of the map.

While encouraging me to follow my nose, my adviser also raised valid concerns about the directions I chose to pursue, and in doing so, helped me to distill my ideas. It was Professor Link who suggested that I expand my research to include visual artists, specifically avant-garde artist Xu Bing. Xu Bing’s work is centered on questions of meaning in Chinese language and culture. He creates nonsense characters—Chinese characters that look like real ones, but are unreadable. Through his work, I was led to question the meaning of Chinese culture in the contemporary world and to find ways this question was repeated in dramatic works. I decided to look at Xu Bing along with the two playwrights and compare the ways in which they broke down the elements of Chinese culture. Perhaps my own process of questioning made me more attuned to the questions raised by these artists. I found that their works of art and drama did not have a clear point, but rather explored a certain set of questions: Why do we revere Chinese culture? What is the basis of Chinese culture? Did such a thing even exist?

Without my adviser’s suggestion, I would never have found a clear connection between such disparate works of art. In the end, he gave me many things: a listening ear, encouragement, well-phrased criticism of my less-than-stellar first drafts, and ultimately, the glue that held my thesis together. However, throughout the process, he also made sure that I remembered that this was my thesis, and that I should trust my instincts. The leather-bound volume now residing in the East Asian studies library is truly my work.

In retrospect, I think that this was the most rewarding part of writing a thesis: the realization that with the aid of a few good hints and a well-timed suggestion that I get my act together, I was capable of producing 118 pages of interesting work. I discovered that plunging into a world of unknowns—once such a terrifying process—will lead you to something extraordinary, as long as you let it. Most importantly, I gained faith in my ability to ask good questions and find meaningful answers to these questions. So…what are you waiting for?
Students like Tarryn Chun—and there are many at Princeton—are the reason why teaching can be pure joy. Here I mean “pure” not only in its sense of “unalloyed” but as a way of pointing out the independent nature of the experience. Working with students like Tarryn is its own reward, a bottom-line reason why one wants to be a professor in the first place. The other rewards that professors get—promotions, prizes, reputations, consultancies, whatever—come almost entirely from research and publication, not from teaching. Academic deans across our country are continually devising ways to promote teaching, but they face an uphill battle. How can one get professors to ignore the obvious reward system and spend time on teaching instead? No deanly device works better, in my view, than do the Tarryn Chuns of the world. They themselves make good teaching happen.

The roles of a university teacher, in my experience, vary considerably with the type of teaching. When I teach the first-year Chinese language course at Princeton, I feel confident from start to finish that I know the right answers about Chinese pronunciation and grammar and that my job is to transfer these to my students. If a student says something incorrectly, I can say, “no, X is wrong, Y is right—here, try again.” The results still depend crucially on the students, of course. The whole enterprise is akin to gardening. I plant some seeds, add some water and fertilizer, and hope for the sun to shine. About eight months later I usually have some healthy sprouts to show, and can point to them and say, “Look, those weren’t there before!”

In my upper-division courses in modern Chinese literature, I assume a considerably different role. There are no “right answers” to the most interesting questions in literary study. A teacher can assist with sources and background, can check for clarity and soundness of exposition, and can encourage creativity and independence. But in the end, exactly what “gets taught” in a literature course remains mysterious. Whatever takes place, it happens deep within the recesses of private minds, where it is hard to measure “sprouts” with much confidence. Students sometimes tell me many years later that they learned this or that in a literature course that I taught, and I am always surprised by what they say.

Advising a senior thesis (or a graduate research project) is yet a different kind of teaching. The “unanswerableness” of interesting questions is the same as in upper-division literature courses, but the mystery about what goes on inside the student’s mind is much less because of the close interaction between student and adviser. With Tarryn, I was privileged to tag along at every step: when she posed research questions, when she looked for sources and methods to help answer them, when she encountered unexpected difficulties and unexpected openings—and made mid-course adjustments to suit—and when she planned how best to present her findings in writing. In watching Tarryn approach her thesis work I felt as if I were watching her enter a room with paintings suspended
from four walls; after she was well along in her study of the paintings, one wall collapsed to reveal another room, hung with more art; entering that room, and studying for a while, another wall collapsed to reveal yet another room, and so on. Tarryn began with two avant-garde plays, found that each was responding to an earlier play, so studied those, found that one of the plays was prefaced by a xiangsheng comedy routine, so studied xiangsheng, found that absurdist language in contemporary Chinese theater had an important counterpart in contemporary installation art, so studied that, and kept going.

My reader’s report on Tarryn’s thesis opened by saying “Ms. Chun has written a subtle, illuminating, and inveterately shrewd study of some of contemporary China’s most sophisticated literary, dramatic, and visual artists.” The phrase “inveterately shrewd” was my attempt to capture Tarryn’s ability to follow where her evidence led and to account intelligently for new facets and sidelights of her topic without getting confused or swamped. This is an ability we advisers cannot teach, but always hope for.

Tarryn is correct that I always ask my senior advisees to begin not with a conclusion that they want to show (many do want to begin this way) but with a question whose answer they truly do not know and that, as far as they can tell, no one else knows either. That way, even if their result is only to show how their original question was misconceived, they still have produced a genuine research result and their own original contribution to knowledge. I can understand Tarryn’s comparison of thesis-writing to childbirth. The thesis does indeed tend to take on a life of its own, to cause pain, to raise hopes, to attract attention from relatives and friends, and to wait till the very end to reveal exactly what it’s going to look like. My perceptions differ from Tarryn’s only in that, to me, the process was not “terrifying start to end.” At no point did it even occur to me that Tarryn might be producing the Frankentome of her fears.

The result in fact was splendid. I wrote in my reader’s report that “some findings of this study are new to the field as a whole and could be published. For example, other scholars have noted the re-appearance of Lu Xun’s Passerby as the Silent Man in Gao Xingjian’s The Bus Stop, but no one has explored the significance of the issue in the depth and subtlety that Ms. Chun provides. No one either, to my knowledge, has demonstrated the imitation (or is it fealty? or satire?) of Guo Shixing’s Toilet toward Lao She’s Teahouse that Chun unwinds in its many layers of possibility. Others have noted ‘the Absurd’ in Gao Xingjian, Guo Shixing, and Xu Bing, but no one, to my knowledge, has drawn out commonalities among the three as effectively as Ms. Chun has, or has shown, as she attempts, that fundamentally these three artists are worried about civilization as a whole, not just the Communist system or the meaning of modern ‘Chineseness.’” Pretty darn good.
Nearly all cultures have some sort of ritual ceremony to mark the crossover from one phase of life to another. These so-called rites of passage aid the individuals, as well as their friends and family, in their transition through this emotionally charged period. Some societies encourage members to mutilate their own genitalia to celebrate sexual maturity. Others require men-to-be to withstand massive amounts of pain sustained over long periods of time, only to welcome them back to civilization by issuing them a hallucinogenic drug that often results in their own death. While Princeton is not quite so sadistic in its trials and tribulations, the senior thesis does serve as a rite of passage that all undergraduates must endure before emerging from the orange bubble into the real world.

My rite of passage began in the spring of my junior year when I approached Professor Christodoulos Floudas of the Department of Chemical Engineering. Possessing a fundamental interest in chemistry, biology, and materials and computer science, I was in the market for a thesis topic that would potentially allow me to dabble in all such fields. He suggested that I consider a project that was co-advised with Professor James Broach of the molecular biology department. I jumped at the opportunity, and months later found myself heading an experimental, theoretical, and computational study of DNA microarray experiments in *Saccharomyces cerevisiae* (yeast). There, I used mixed integer linear programming optimization techniques to infer knowledge about the glucose signaling pathway that had previously been determined using purely experimental techniques. In addition, I critically evaluated new and existing numerical algorithms for gene clustering. Finally, I proposed a novel integer linear programming formulation for determining transcription binding motifs among co-regulated genes. This work taught me the techniques and the mentalities that will be necessary to go about sorting, digesting, and understanding any genome—a task of which the post-Human-Genome-Project world is very much in need.

In deciding upon my project and the faculty members that I would turn to in the rough times, I discovered that one of the great facets of the senior thesis is its ability to provide students with the opportunity to satisfy their curiosity in a completely unexplored realm just as readily as those who wish to expand upon previously developed, deep-rooted interests. Having only moderate experience with computer programming, I chose to explore a topic relatively foreign to me. Though I initially found myself floundering about in an element I did not even recognize, I soon established my niche under the indispensable laboratory and classroom guidance of Professor Floudas. I believe that much of my understanding of the fundamental state of bioinformatics derived from this exploratory period where I was feeling out which portions of the field interested me the most.

Characteristic of a typical rite of passage, the senior thesis is an experience not entirely reserved for the individual—much of its importance is
derived from the spectators you encounter. Inspiration came from people and places I never would have imagined. By the time I marched down McCosh Walk with my 129-page leather-bound firstborn, I had received countless hours of assistance from my advisers, invaluable guidance from graduate students in my department, encouragement from the Frist staff, Facebook messages from high school friends, homemade cookies from family, extensive counseling from roommates, and about 2,000 of my classmates’ shoulders on which to lean.

After the due date for your senior thesis comes and goes, current and future seniors, I encourage you to look back and reflect on your experience. Just like the hundreds of thousands of Princetonians who have previously completed their undergraduate journey, you will have made a unique and novel contribution to the scholarly community. With the completion of the thesis, you will have gained a newfound outlook on academics, friends, and connections that will have defined your college experience, and perhaps most importantly of all, the right to call yourself a Princeton graduate.

Christodoulos A. Floudas
Stephen C. Macaleer ’63 Professor in Engineering and Applied Science and Professor of Chemical Engineering

Advising and working with talented and dedicated senior thesis students such as Cole DeForest has been a unique component of my teaching experience at Princeton University. Cole’s project focused on elucidating key questions on the topology of signal transduction networks in *Saccharomyces cerevisiae*, and Professor James Broach and I served as co-advisers.

Cole’s thesis work made three significant contributions. First, he introduced a novel integer linear optimization approach for the prediction of transcription factor binding motifs among co-regulated genes. The primary thrust in this approach is that it does not require a priori knowledge of the length of the motif, which is a common hypothesis in existing motif discovery methods. Second, he compiled a database of all known transcription factor–gene interactions, exploring both experimental and computational techniques. Third, he combined a mathematical framework for the prediction of the network topology with the developed database and time series microDNA array experimental data. This approach was based on a clustering of the genes, a super-graph representation of all possible structural alternatives, and the formulation of a mathematical model whose solution extracts a rank-ordered list of possible network topologies which explain the observed experimental trends or suggest additional experiments and/or possible connections in the graph theoretical representation.

During the course of the senior thesis research, Cole addressed systematically the open questions and maintained a consistent and highly
productive pace. His enthusiastic and fearless approach of attacking such challenging problems was complemented by a remarkable level of independence and a strong drive for excellence. Cole's ability to quickly identify the limitations of existing approaches for motif-based discovery was followed by an original mathematical modeling and optimization framework which offers advantages compared to the existing approaches.

Advising Cole was a rewarding and stimulating experience, from our initial discussions on the problems and their challenges, to the creation of the proper level of mathematical foundation, to the innovation and discovery of new approaches put forward in his senior thesis. Cole's thesis work has generated new ideas and methods for the topology of signal transduction networks which serve currently as a basis for advancing our research frontier.
For my senior thesis, I got to do something that most people drop out of college to do: I played some guitar, wrote some songs, and got a band together. The whole time I worked on it, I was getting away with murder. People suffer for their theses. I did what I probably would have been doing anyway.

Of course, Princeton being Princeton, what I would have been doing anyway somehow morphed itself into an extremely challenging experience. Writing songs had always been a solitary, slightly shameful endeavor; now I had the world’s most important poet writing in English and my favorite composer/life hero in the room to hear every missed chord and garbled lyric. I spent the fall semester working with Paul Muldoon and feeling incredibly dense, and the spring semester working with Dan Trueman and feeling three steps behind. When it was all over, a full year of ignorance gave way to a few weeks of ridiculous arrogance. I felt sharp and mature, and I knew that I had taken advantage of an opportunity that wouldn’t come my way again.

When I first started thinking about my thesis at the end of my junior year, I thought I wanted to figure out how to combine songwriting and modern chamber music composition so that the styles blended together without seams. There would be four or five songs with some vague thematic connection emerging out of a hazy bed of strings and woodwinds. Beyond that I hadn’t really given it much thought. I patted myself on the back for coming up with such a great idea.

Around the middle of August, I took a chance and e-mailed Professor Muldoon to see if he’d advise the lyrics for these songs. Since I had been admitted to Princeton I harbored a secret fantasy of writing a bunch of songs with Professor Muldoon, but by the beginning of senior year I had pretty much written it off. I still hadn’t met him and wasn’t enrolled in the creative writing program, so I was surprised by his prompt reply. He said he’d squeeze me in and give me his five cents worth. He also set the tone of his advising with a blunt but accurate observation of the songs I’d sent him: write something else—these all sound the same.

For our first meeting he wanted me to write a single verse and bring it to him to workshop. He heard me out on my chamber suite idea, but told me to focus on the individual parts, not the whole. Also, he insisted that I write the lyrics to all of the songs first to ensure that, no matter what happened with the music, the songs would have a beginning, middle, and end. I had never written anything that way and wasn’t looking forward to it.

I overcompensated for this anxiety by bringing in lyrics to two fully fleshed out songs, music and everything, instead of just a single verse of words. Professor Muldoon immediately pegged the songs as bland and unfocused and suggested that I come back the following week with a verse based off the one promising line in the entire lot: “You curl in bed
like a roll of film.” Over the course of the week I wrote what I considered a pretty good, short song consisting of two verses set to a melody and an active guitar part—something that would fit right into my chamber suite. Our meeting that week was brief. I strapped on my guitar and sang the song in his office, and he told me again to throw everything out except “You curl in bed like a roll of film” and return in a week with a single verse, this time specifically without music.

Over the next few weeks I would write verses and he would show me a direction they could take by rewriting a line or two. His rewrites of my verses were lean and stuck exclusively to the language of the situation at hand, with no sloppy allusions or half-conceived tangents. I remember feeling nervous at the prospect of writing songs that revealed their subject matter so transparently. At the same time I knew that this style of writing would sound easy and natural being sung. My verses confused vagueness with significance and wouldn’t convey any narrative movement in real time. His suggestions rooted them in tangible situations, setting up a drama that would commit me as a singer to tell a story.

With that, my chamber suite idea unraveled. Professor Muldoon had focused all my efforts into choosing individual words and phrases, and I found it impossible to try to map each of these decisions onto the sprawling framework of my chamber suite idea. My original top-down approach had more to do with my ambition to create an impressive final product than the through-and-through quality of what I would be singing. Not surprisingly, the less I thought about the end result, the easier the songs came together.

By the end of fall semester, I had the lyrics to three songs—“Exposed,” “John Walker Lindh,” and “Evenings I Spent Gazing.” Writing the lyrics first had now put me in an awkward position regarding the music. On one hand, I felt the lyrics were as compelling as I was capable of writing, and that each song had a built-in structural logic that would translate well into music. On the other hand, I had no idea how to turn the even-metered lines I’d written into plausible melodies without everything sounding like a stock folk song or a hymn.

Professor Trueman, my adviser in the music department, played an indispensable role in helping me move the songs from raw text to basic guitar and voice arrangements, and then from guitar and voice arrangements to the more fleshed-out, ensemble sound. He taught me how to look at composition as a process of setting up the correct approach to the material so that I could focus on a local issue and be confident that it would affect the larger work in a good way. Oftentimes the correct approach involved limiting the number of compositional variables at work in order to build a solid foundation in one aspect of the music, and then to work outward from there.

For example, he told me to focus on the rhythm of the first line of text of the first song, and to figure out how I wanted that line to scan as a phrase before I thought about the melodies, harmonies, or anything else. I could do this by abstracting a few steps from the surface of the music and writing out several different rhythmic phrases to set the text, some true to the way the line would
be spoken, and some deliberately accenting unusual syllables. Once I did this, I could write a separate line of rhythmic “counterpoint” to play against each possibility. Then I could selectively make certain notes higher than others, so that each line took on a rudimentary melodic shape. At the end of the exercise, I could determine which phrases held the most potential for a good melody.

Through this exercise, I was able to set the text of the first verse of “Exposed” to a melody that sounded natural to my ears but would not have immediately come to mind. When I went to set the other two songs to music, I followed the same approach of focusing on rhythm to get the hook of a phrase, and then using that hook as a foothold into the rest of the song. Once I got a few ideas together, I’d record and listen to them to try to get the proportions of each section right. I did most of this during the long break between classes in the winter. It was like high school all over again—hours and hours in a room playing the same thing.

After setting the three songs to music and coming up with the core guitar parts, I was left with the task of arranging the songs. As part of a general advising trend of emphasizing clarity and fidelity to the source material, Professor Trueman suggested arranging the songs in collaboration with the performers. This would ensure that the arrangements would sound natural. The players would react to my songs as listeners, and approach their parts as musicians familiar with their own instruments and styles of playing. It would also mean that the real work of getting the songs together would be done through playing together, which was a familiar situation for me, since my musical background involved lots of bands and garages.

Looking back, I realize that all the hours I spent revising lyrics and honing melodies amounted to a big, fussy preparation for the limited time I would have collaborating with my performers. Professor Trueman’s insistence on composing with people, not with pen and paper or a computer, challenged me to reconsider what I thought songwriters actually do. Previously I thought you could write a song by yourself and it would be done, and if you played it for someone or arranged or recorded it, that was incidental. Now I only cared about how my songs came across in a single, live performance.

This was when I really felt as though I was getting away with murder. Professor Truman told me to scale down my band to the bare essentials and pointed me to two musicians who could play circles around me, Brittany Haas and Ben Markowitz. Instead of long hours debating what note to write on a page, I met with Brittany and Ben once a week to jam and rehearse. The instrumentation (fiddle, guitar, and acoustic bass) was clearly traditional, but we each brought different musical backgrounds to the songs and found plenty of room for creativity. I got my roommates and friends to sing background harmonies. When it came time for the performance, we were well
prepared and confident, and I felt that I had somehow brokered a bunch of music that I never could have written myself. The recording didn’t turn out too well, but I couldn’t have cared less. Pretentious as it sounds, I felt that my thesis happened in the rehearsals and the performance, and that the recordings and notations that I turned in served as paperwork to prove that I did something.

In the end, my thesis didn’t transport me into unfamiliar territory or prove to me that I could accomplish more than I thought possible. Rather, my advisers forced me to reevaluate the ground on which I was already standing, to focus overwhelming attention on each step of my creative process and challenge assumptions I didn’t even know I held. I’m still uncovering all of the things that I learned. I think that’s a good sign.

Paul B. Muldoon
Howard G. B. Clark ’21 University Professor in the Humanities and Professor of Creative Writing in the University Center for the Creative and Performing Arts

Most of us go to work each day and expect to be doing something along the lines of what we did yesterday, last week, last month, maybe even for the last 20 years. For the writer, it’s as if each day one has to apply, or reapply, for one’s own job. More troublingly, the writer’s not even certain of what the job is until she or he’s on it.

This is an aspect of the writing life that is rarely mentioned, particularly in the context of a university, where the focus is quite properly on what may realistically be taught, and learned, on what may stand the writer in good stead from one circumstance to another. That fact notwithstanding, my own main ambition as a teacher is to try to foster a profound sense of ignorance and humility—what Wordsworth referred to as “wise passiveness” and Keats as “negative capability”—in which the student gives herself over to the unknown just as readily as to the knowable.

When Christopher Douthitt came to ask if I might serve as a second, unofficial, adviser for his thesis, I was somewhat skeptical. I was already supervising two thesis students in translation and was fearful about the time I might be able to devote to him. I insist on meeting with my advisees for at least half an hour a week, right through the academic year. I was also skeptical less about Christopher’s ability to see through his project of writing three songs than in my ability to help him see it through in a way that would be pedagogically sound. My own songwriting experience was limited, though I had once a crash course with a master, the late Warren Zevon, and thereafter gave myself over to some intensive “distance learning” with such professors as Cole Porter, Irving Berlin, and, in particular, Ira Gershwin.

In any event, I accepted the challenge of working with Christopher and agreed to meet with him at least while he was working on the song lyrics. I
insisted that, in this case at least, the words should precede the music. This insistence was based on the fact that the first lyrics Christopher had produced were simply not up to the mark. I gave him my opinion quite directly and reminded him of how I perceived my role as a thesis adviser. Simply put, the adviser’s job is to allow the student to achieve her or his absolutely highest potential.

I’m fairly certain that, over the next six weeks of the fall semester, Christopher regretted his ever having asked me to help him, for the simple reason that I would not allow him to proceed until he had the first line of the first song right, then the second line, then the third. Slowly but surely that first song, “Exposed,” began to find its shape in the world and clear a space for itself:

You curl in bed like a roll of film
My dark room door is closed
You’re the one who’s buckling to my will
But I’m the one exposed.

Here I’d encouraged Christopher to allow the menace and meanness of this situation, and the system of imagery drawn from photography, to dictate the argument of the song, including the witty paradox of “I’m the one exposed.”

In his second song, “John Walker Lindh,” Christopher managed to give something of his own family history, the story of his brother “born again,” the weight of myth by exploiting a ballad form:

That was my senior year
You came back from UW
And lived on Eighth and Ash
In Christian fellowship.

The casual specificity of “UW” and “Eighth and Ash” give this lyric a wonderful density and sense of verifiability, a feature carried over by Christopher into the stark, almost literally bare-boned simile in the first verse of his third song, “Evenings I Spent Gazing”:

I remember evenings I spent gazing
At the vault of the chapel
Now I’m staring at your ribcage
In the darkness of your room.

Here at last was the combination of directness and depth, simplicity and substance, which is a mark of so many great songs, a starkness which

Simply put, the adviser’s job is to allow the student to achieve her or his absolutely highest potential.
brought the reader back round to the imagery of the “dark room” in “Exposed.”

One of the mysterious aspects of songwriting, particularly if one uses this method of writing words that precede music, has to do with taking into account something that is unaccountable, something that is missing on the page. In the ordinary course of events, one wants to finish a piece of writing; in writing a song, one must figure in leaving something out, of leaving it unfinished. It’s as if in that aspect of the song there’s a crystallization, a concretization, of the very unknowable to which I alluded earlier.

I was now happy now to step back, or stand down, and allow Christopher to work with Dan Trueman to give body to the soul—or soul to the body?—of his words. Next morning, as usual, I sat down at my computer and reapplied for my own job as poet and professor.

Daniel L. Trueman
Assistant Professor of Music

How to advise a brilliant young singer-songwriter? This was the question I had to consider when Chris Douthitt asked me to be his senior thesis adviser. I had known Chris since he arrived at Princeton, and he had survived several challenging composition classes with me. But in the classroom, I am the boss; while there is certainly room for creativity when studying the counterpoint of Palestrina or Bach, in the end Palestrina and Bach always prevail, and it is usually up to me to be their messenger if the student doesn’t see how he or she is coming up short. The situation is radically different, however, when advising a student on their own creative work, especially something as ephemeral and often impenetrable as song. No longer can I simply point them toward a primary source for reference; now they are the primary source.

This is further complicated by the fact that songwriting is an art that sometimes is most vital in younger musicians; it would be hard to argue that Billy Joel, for instance, became a better songwriter as he aged—perhaps more professional, skilled, but not better. And yet, young songwriters can be particularly sensitive and insecure; while many songwriters and composers survive poor mentors (most have stories to tell), it’s impossible to know how many lose their way after being given a harsh critique at just the wrong moment. Fortunately, I wasn’t particularly concerned about this last possibility with Chris; he is quietly confident and in it for the long haul, I’m quite sure. But the point remains: advising a young songwriter can be tricky business.

One of the wonderful and challenging things I have encountered in my short time advising at Princeton is just how far afield one can be taken by the interests of these terrific students. Just this past year I also had the pleasure of advising Clare McNamara, whose excellent thesis focused on the music of yoga; while I practice yoga, I knew very little about the music and was delighted to
learn. Some things, however, can be too far afield, and it is necessary to send an advisee elsewhere for additional feedback. My own history as a songwriter has taught me that I have very little to say with lyrics, and while I felt quite at home advising Chris on how to handle his lyrics musically, I wasn’t comfortable working with him on the lyrics themselves. In songwriting, the composition of music and writing of lyrics is delicately intertwined, and Chris had told me that for these particular songs he wanted to begin with the lyrics and then work on the music, a reversal of his familiar creative process where he would compose the music first and then finds words to fit. The words then, take on a more powerful role in determining how the songs will turn out. Fortunately for Chris (and me), we happen to have a Pulitzer Prize-winning poet who also writes lyrics right here on campus, and I advised Chris to approach Professor Paul Muldoon.

After meeting with Professor Muldoon for a couple months, Chris set to work on the music, and for me the fun began. I was able to be involved in his process at all stages; at the beginning, idea generation stage, through the roughing out, and the final revisions. As a composer, I am daily confronting my own creative issues, and it was refreshing to be, as songwriter Danny Elfman put it, “on the outside looking in.” I encouraged Chris to be sensitive to the musical nature of the words he had written while not allowing them to overly dictate the music; at times, the music would need to go its own way, on its own terms, in counterpoint to the words. I also encouraged him to begin work early on with the musicians he wanted to play with; I felt his ideas would change in interesting ways if he saw and heard how his musicians responded to them. Chris is an accomplished composer, fully capable of working out every last detail, writing it down, and handing a player a finished product to execute. Sometimes, however, this is the easy way to go; allowing others inside your creative process takes confidence and forces you out of the comfort of your creative isolation. But the payoff can be substantial; it is hard to imagine, for instance, the music of Duke Ellington being what it was without the particular players who made up his band. He wrote for those people and their idiosyncratic abilities and his music grew with his band.

Chris is not the kind of student who needs structure; he always let me know when he was ready to meet, and I was never concerned about his progress—Chris can’t help but write music. But I was particularly impressed with how Chris handled the difficult moments. Professor Muldoon certainly sent him back to the drawing board again and again, and his songs presented the inevitable obstacles, refusing to reveal their secrets easily. Rather than give up on a song, or bludgeon it to death with technique, Chris gracefully handled these challenges, letting the songs come to life naturally, throwing away what didn’t work (something that is hard for all of
... it is crucial, especially with the creative arts, to be patient with the process...

us to do!), and never backing down from what must at times have seemed like an impenetrable barrier. While songwriting is certainly at times just sitting around with a guitar and letting your fingers roam, good songwriting is always more, and sometimes the trick is knowing when to put down the guitar and try another approach.

This may seem antithetical to the nature of the Princeton thesis, but over the course of the year I discouraged Chris from being overly ambitious with the scope of his thesis. My advice: Rather than write two more songs, make the three you have better; and, rather than write for a big ensemble, write for just one or two other players, but spend a lot of time with them. And so on. I think it is natural for Princeton students to feel that their life’s work is at stake and to shoot for the moon, but sometimes shooting for the moon takes the shape of something that appears less ambitious, and it is crucial, especially with the creative arts, to be patient with the process; having a big garden does not guarantee a healthy harvest.

In the end, Chris wrote three beautiful and intriguing songs. He worked closely with two of the fine student musicians we have on campus here (Ben Markowitz on bass and Brittany Haas on fiddle), and also recruited his roommates to sing harmonies on the last of the songs. In the first performance, Chris and his band simply walked on stage and played, with no amplification or fuss; it was as though we were invited into a common room to be told a story. I am quite sure that I will hear these songs again, perhaps when I least expect it. More importantly, I anticipate hearing new songs from Chris, and Chris, I suspect, will continue to get better and better.
For a Princeton freshman, the senior thesis looms like some final frontier, a destination so distant that it’s hard to believe any undergraduate has ever reached it. I was going to produce a hundred pages bound in hardcover? I was going to work for an entire year on one huge paper? All in Times New Roman, size 12? All before my 22nd birthday? Without losing my mind?

But by April 2006, it was my mind that could not bear to lose my thesis. I was tweaking and massaging my prose until my adviser told me to relinquish my file to the bookbinders. This is because my topic truly interested me. No, that’s a horrific understatement. For the better part of a year, my topic captivated my intellectual curiosity, generated the majority of my neural activity, and occupied nearly all the RAM of my beleaguered laptop. I lived, breathed, ate, and digested it. I had arrived at this engrossing topic by seizing an opportunity to meld some of my longtime personal interests with an investigation into texts that were always excitingly new to me, and sometimes largely new to scholarship. And I found this topic only because I was on the lookout for it long before senior year.

Indeed, the story of my senior thesis really begins during my sophomore year, when I took ENG 201 and 202, then the department’s introductory course sequence. It was in ENG 201 that I was introduced to John Milton for the very first time. I had come to Princeton after 12 years of a traditional Jewish education that had instilled within me an appreciation for textual interpretation and ancient theological-historical narrative, while leaving me completely unfamiliar with Milton. Now I fell in love with this verse that was lofty and audacious, yet dense enough to sustain round after round of intensive critical exegesis. When reading Paradise Lost, I could exult in biblical expansiveness while also feeling deeply ensconced within an unfathomable matrix of allusion. That same year, while chatting with my resident adviser one evening, I said that I thought I might want to write my thesis on Milton.

During one particular ENG 201 precept that same fall, Professor Oliver Arnold mentioned that Milton read and wrote in Hebrew. This was a fact that stuck with me the following year when, padding through the darkened literature stacks on the B floor of Firestone, I spied a thick green volume titled Milton’s Rabbinical Readings. By the spring of my junior year I was taking Professor Nigel Smith’s course on Milton and writing a junior paper on that poet’s reading of the eighth-century midrash Pirkei de-Rabbi Eliezer. Professor Smith introduced me to John Selden, the 17th-century English parliamentarian, legal historian, antiquarian, and Hebraist whose scholarly work on Judaica has been coming into some critics’ focus as a leading candidate for Milton’s most significant Hebraic influence. My junior paper research left me with as many questions about Selden as answers, and I knew I wanted to continue my inquiries at the primary source level. Thanks to the generosity
of A. Scott Berg ’71, through the annual research fellowship that he established in the English department, I was able to continue my research during the summer at Duke Humfrey’s Library, within Oxford’s Bodleian Library. There, I sought, found, and explored Selden’s marginalia and markings in the 1550s-era volumes of the Babylonian and Jerusalem Talmud which occupied his personal library until they were bequeathed to Oxford in 1659, five years after his death.

Professor Smith reminded me on more than one occasion that the senior thesis process is in many ways even more important than the senior thesis product. And before my process of writing even began, there was the process of research and investigation. I have known few academic experiences more enriching than the process of research in rare books and manuscripts—following bibliographic leads, interpreting reference catalogs (some of which are rare books themselves) and the subsequent catalogs to those catalogs, and analyzing every clue from epigraphs to handwriting to ink and pencil. Nine months after leaving Oxford, I was completing a senior thesis about Paradise Lost. The thesis incorporated some of this research into a critical study of various Hebraic resonances that seem to be intertwined with Milton’s heterodox inclinations—resonances which carry through some of the Selden texts that Milton is believed to have read. From the very beginning of the process, I approached my thesis topic with a broad vision. But as my ideas evolved and my research progressed, I developed a careful focus on a definable scope, zeroing in—in “microscopic” fashion, as Professor Smith once described it—upon the possible intertextual significance of a few particular moments within Selden’s Hebraic scholarship. Along the way, I situated my study within a wider and somewhat better known discourse in Milton criticism about the poet’s heterodox tendencies.

Indeed, as I’ve said, my project was deeply rooted in the familiar while also branching far into areas that felt profoundly new and unfamiliar to me. Here was Selden, a Christian mind engaging deeply with the wisdom of my own non-Christian religious tradition, writing in the midst of Christian England’s first significant foray into the republicanism that would later become a model for the birth of my home country. In writing my thesis, I was often working with a Jewish tradition that I had known all my life. But I had been completely unfamiliar with the notion that there might be some connection between Judaic texts and the poets of early modern England. And nearly just as foreign to me was the work of those poets themselves—after all, I had known nothing of Milton until my second year of college.

And then I was attempting to become familiar with the mind of a 17th-century polymath whose Hebraic work was still locked in relative obscurity—and in the notoriously tortuous Latin that ultimately required the translation assistance of two patient graduate students. Scholars have barely begun to plumb the depths of this extraordinary mind and its encyclopedic but subtly nuanced creations. Professor Smith once gave me quite a chuckle by recounting the tale of one 20th-century academic who had attempted to write a definitive and comprehensive
...the senior thesis process is in many ways even more important than the senior thesis product.

Indeed, in my view, the most wonderful aspect of the senior thesis is that it provides an opportunity not only to say something original, but also to blaze your own path into scholarly territory that may be largely unexplored or uncharted. Seizing such an opportunity is perhaps the greatest way to approach your biggest undergraduate project, especially if you feel passionately curious about your topic, and if you have your adviser's good guidance along the way. I am a firm believer that one should meet with one's thesis adviser much in the same way that Al Capone purportedly liked to cast votes: early and often. From the first time I stepped into Professor Smith's office as one of his spring junior paper advisees, I knew how fortunate I was to be the beneficiary of his formidable insight into early modern English literature and history, and of his constant attention and sensitivity to my writing process. From the day he first introduced me to Selden's Hebraic scholarship, to the summer afternoon when we met for coffee across the street from Oxford's Bodleian Library, to the many fall and winter meetings in 31 McCosh, and all the way through to the last page of my thesis, my relationship with my adviser was inspiring and indispensable. In meeting after meeting, Professor Smith listened to my developing ideas and offered his incisive comments. He suggested healthy deadlines and thoughtfully critiqued every draft I sent to him. We often sat and talked for surprisingly long swaths of time. Through the process of vocalizing my thoughts in conversation with him, my observations and insights began their gradual evolution into full-fledged arguments and, eventually, thesis chapters. And then, one April morning, I found myself captivated yet again by something strikingly unfamiliar: the experience of being done with my thesis. I'm still getting used to the feeling.

Nigel Smith
Professor of English

I had been warned by my colleague Andrea Schatz in the Society of Fellows that there was an inquisitive and extremely studious undergraduate called Nathaniel Fintz who was interested in the impact of Judaic writings upon English literature. He knew Hebrew and he was headed for my Milton class.
“Great!” I thought to myself, “I’ve been waiting for this for years.” Nathaniel was then assigned to me for his second junior paper, and it was in the context of this earlier exercise, and against the background of the Milton class, that we were able to take a long look at the matter of how some highly significant figures in 17th-century English literary culture were able to know so much about Judaic traditions of biblical and legal interpretation. Through regular discussions, we found a topic that could be researched, and we then thought about how it might be represented in a senior thesis. We discovered that the investigation was divided into three questions: how the English lawyer John Selden came to know Judaic writings, how he made use of them in his own work, and how the poet John Milton may have used Selden’s writings.

We then planned what needed to be done. The first part of the project ideally required Nathaniel to visit Oxford’s Bodleian Library where Selden’s books and papers are deposited. There, Nathaniel would see if he could determine from letters, and any notes or other inscriptions on the books, the extent of Selden’s direct contact with primary Judaic texts, including the Babylonian and Jerusalem Talmuds. This would necessitate looking at pencil annotations in Selden’s hand, some apparently in Hebrew. Then Nathaniel had to go through these books and Selden’s own writings to see how his Hebrew learning was put to use. Here, a major obstacle was that Nathaniel had little Latin, and would need some help translating Selden’s work, which was mostly written and printed in Latin. Finally, we arrived at the center ground of English literary criticism: Milton’s own poetry and prose which was to be examined for traces of Selden’s Hebraic knowledge.

Off Nathaniel went to Oxford for the summer of 2005, aided by the A. Scott Berg ’71 scholarship fund in the English department, and I watched him there in the 15th-century library of Duke Humfrey (and where one section is in fact called the “Selden End”) working intently, complete with orange Princeton cap, figuring out the discoveries that would make the foundation of his thesis so strong. At the same time, he was also able to give time to reading Selden’s work more intensively, and the works of other early modern Hebraists. When we met again as the fall semester began, I knew that Nathaniel needed to keep focused on this material while at the same time also to look again at Milton’s text, especially his great epic poem *Paradise Lost*, so that what was a study in intellectual history could also become a work of literary criticism. As we met through the fall, and despite all the other things he had to do, I watched Nathaniel find two main points of entry into Milton’s poem and exploit them for the richness that could be found in them and which would be the grounds for a highly focused discussion of rabbinic tradition in Milton’s work. One was concerned with public debate and the standard set in the functioning of the Israelite Sanhedrin or parliament; as embodied in *Paradise Lost*, Milton’s republicanism was developed with apparent reference to rabbinic understandings of the relationship between rational discussion and authority, and with a preference to the teachings of Rabbi Joshua over Rabbi Eliezer. The other was to do with Milton’s criticism of reliance
not on personal judgment but externally imposed rules and boundaries. Here, Nathaniel showed how Talmudic symbols, taken up by Selden, could be suggestive for the landscape of Milton's Eden.

I've set all this down in this way because it is faithful to the plan that Nathaniel devised and that was so important in guiding him through to completion. The very fact that it was such a well-thought-through plan meant that he could devote himself to many hours of thinking and reading in a productive way. It enabled him to read extensively in Hebraic and Milton scholarship, and to redraft so that his argument was honed as finely as possible. But this does little justice to Nathaniel's confident, willing character and his love of a good, contentious discussion of the meaning of this or that passage. This gave him the perspective, the discipline, and the humility he needed to finish his book. It had been my general aim to see if he could bring together the interpretative methods developed in rabbinical tradition and make them work productively with the different approaches of modern literary criticism that he was acquiring as an English major. I believe he did this. It was an utter delight to work with him, however many times we met. It was in these meetings that we subjected his developing argument to a great deal of critique: Nathaniel tested its strength at every stage and kept making it stronger. “Character” should be underlined. We often face seemingly insurmountable problems in our lives and work, and certainly having little Latin was a serious handicap. But Nathaniel overcame this to produce some truly original work. As Nathaniel delivered his bound thesis to McCosh Hall, so Oxford University Press published a book on Selden's Hebraic knowledge, the result of many years of work by Jason Rosenblatt, a distinguished Milton scholar from Georgetown University. Nathaniel's thesis works in an entirely different way to Rosenblatt's book, but both investigations stand in fruitful complementary relationship to each other. The joy of discovering new material, that dusty old tomes could in fact make a lot of exciting sense, is evident throughout his thesis; had there not been deadlines to beat I am sure he would have just motored on and worked on the book that might well indeed be there for him to write in the future. Writing as I do over a weekend when the Princeton Tigers football team dragged victory from the jaws of defeat against Harvard, there can be no better example of what courage can do than overcoming an impediment, and to great effect. Sticking to your guns, having some courage, and thinking quietly about how you might solve a problem counts for a lot, especially when the softer solution of a less impressive route presents itself. That is what makes a great senior thesis in English: a good idea, being unafraid to go somewhere that has not been visited before in quite such a way, and a journey where the pathway is not necessarily obvious. Then you need a good plan, the willingness to redraft and redraft (since rewriting will make for improvement), and finally, to adapt Shakespeare, “screw your courage to the sticking-place.”
Shortly after the start of senior year, I trekked over to Mudd Library, ostensibly to look at the formatting of past senior theses but really just as another act of procrastination prior to actually writing those painful first few words of my thesis.

I started with just a few theses, asking the librarian to help me find one thesis from a 2005 graduate of the psychology department whom I knew and respected and two that had been written by students who had previously worked with my adviser. Rather than retreat to my dorm and lose myself in MTV reruns, I decided to check out some more psychology theses.

Before long, I completely abandoned the pretense that I was just there to get ideas about formatting. I found my father’s thesis, written in 1967, typed laboriously on some ancient Smith Corona manual typewriter. I took a deep breath and typed my thesis’s first words on my IBM laptop. My father’s thesis dedication to his parents provided the inspiration to start my writing process and crystallized what I wanted to write to my parents. Although my dedication had nothing to do with my topic or my scientific research, somehow compared to an otherwise completely blank Word document, it was a very satisfying sense of beginning and a springboard to many pages that followed.

The beauty of the senior thesis is that each writer has complete discretion in choosing a thesis topic and deciding how much to devote to the project. Like most people, I understood that I must have a genuine interest in a topic to stay engaged for a protracted period of time and to maintain enthusiasm through periods of inevitable writer’s block.

My introduction to independent work came in junior year with Professor Joan Girgus, whose office was always open and whose guidance I constantly sought. When it was time to choose advisers second semester, I knew that I wanted to continue the relationship we had formed. After focusing on post-traumatic stress syndrome for three of my four junior papers, I was ready for a change but had no real inspiration in mind.

Professor Girgus took an active interest in my life outside of academics; she made a point to listen to WPRB whenever I did the color commentary for sporting events and to comment on articles I wrote for the Daily Princetonian sports section. Using these activities as a reference point, she helped me formulate a topic that included my interest in sports. I focused on the role of achievement goals and team outcomes on self-referent affect and attitudes in athletic competition.

For American youth, participation in organized sports increasingly entails perceived pressure to win and to use that success as a conduit to acclaim and rewards like college scholarships or professional sports vocations. At a time when Little League baseball games draw significant coverage on both cable and national television networks and high school basketball players jump directly to professional leagues and achieve iconic status in
their teenage years, sports have become more than just playing games. For many children, the perception of personal success on the playing fields and courts impacts their sense of self-worth and even their career aspirations. While some people play because of their intrinsic interests, others derive their motivation from external forces.

When children start playing sports, they have impressions of their personal competence formed by previous experiences and feedback from those around them. Their performance in sport and their observations of others’ performance help to refine that sense of self-efficacy. While some children react to failure adaptively, using it as motivation and a means by which they can change or update their problem-solving strategies, other children respond helplessly when they lose. Attempting to determine why these differences occur could help encourage more children to continue playing sports and could extend to helping them deal with failure in other areas of their lives as well.

My subjects were enthusiastic 11- to 14-year-old basketball players, both boys and girls, in the Princeton Recreation Department’s league. Over the course of six weeks, I monitored their positive and negative affect, self-esteem, attitudes on sport participation, and self-talent ratings to see how those dependent variables were affected by wins, losses, and the motivations the children had for playing. Administering surveys to children who were normally running from their basketball games to their next Saturday activity wasn’t always the easiest, but I was lucky to get a consistent group of responses.

The results of my study indicated that children who were interested in proving their ability were more likely to become more discouraged following losses than those who were interested in improving their ability. In the world of youth sports, a clear, practical application and lesson garnered from this experiment is the efficacy of enjoyment and mastery motivations over the one-dimensional objective of winning. The priming of individuals, particularly youth, to accentuate goals of learning over goals of boosting egos should be utilized at every possible opportunity; this is an objective as viable for the athletic field as for the classroom. In order to ensure that children maintain a high level of enjoyment, coaches, parents, and league representatives should make every attempt to emphasize skill-building and to focus on personal improvement.

Each article I would read and each statistical analysis I would perform seemed to yield at least five new research areas and five new data techniques. One of my independent variables was too complicated to analyze using basic statistics, and I had to work with a number of different psychology professors in order to figure out a way to begin to approach it. With my deadline rapidly approaching, it was frustrating to realize that I would have to impose some limits on how much I could explore.
After the relief and joy of turning in my thesis, I returned to Mudd Library. My own work hadn’t yet been added to the scores already in the shelves, but it probably has been by now. It might not be checked out this year or even in the next five years, but eventually I hope that some other student looking for inspiration—or even a distraction—may come across it as she peruses theses by Princetonians of previous generations.

Joan S. Girgus
Professor of Psychology

Senior thesis advising is my favorite kind of teaching. In psychology, students can choose to do either a library thesis or an empirical thesis. I always encourage students to choose the latter because it provides an opportunity for each student to embark on a truly new learning adventure. Doing psychology, as opposed to learning about psychology, requires the development of a hypothesis, the design of a research project to test that hypothesis, the selection of appropriate measures and methodologies for the project, the gathering of data, and the analysis and interpretation of the data you have gathered. All of this is quite different from the work that students are accustomed to doing in their courses. An empirical senior thesis teaches students what it feels like to do psychology; no amount of reading can substitute for this. Furthermore, an empirical senior thesis provides astonishing opportunities for “just-in-time learning,” and one of the things research has shown is that this is the most powerful kind of learning there is. When students tell me that they still remember every detail of their work on the senior thesis, I believe them.

One of the great rewards of teaching is the opportunities it provides to watch students grow and change. Senior thesis advising provides opportunities to watch that process in exquisite detail. Every teacher would like to know, even in a large lecture course, how each student is progressing; if we had such feedback, faculty could adjust their teaching to achieve maximum learning. This kind of feedback occurs routinely in the context of senior thesis advising. In this sense, senior thesis advising is not so much different from other kinds of teaching as it is a more intense version of what we try to do day in and day out.

Stirling Fiss’s senior thesis epitomized the aspects of senior thesis advising that I find most inspiring. First of all, this was very much Stirling’s thesis. The best research in psychology melds the researcher’s everyday experience with an interesting theoretical perspective. Stirling’s major extracurricular activities were providing radio commentary and writing *Daily Princetonian* articles about football and basketball games. Thus, she had had a wealth of opportunities to observe how different athletes reacted to winning and losing. There is an important body of psychology research that argues that the goal-orientation people bring to achievement situations determines how they will react to the successes and failures that they experience. People who see achievement situations as an
opportunity to learn something and to master a set of skills will respond to failure with increased persistence and a preference for difficult problems; people who see achievement situations as an opportunity to demonstrate their competence react to failure with avoidance of similar problems and a preference for easier ones. Virtually all of the research on this question has been done in academic achievement situations. When Stirling came across this research, she began to wonder whether similar effects could be found on the playing fields and courts.

Moving research from one setting to another is not always as simple as it sounds. Research on academic achievement can be done in a laboratory setting since the laboratory resembles a classroom (without the distractions). The researcher brings participants into a room, sits them at a table, and gives them problems to solve. The characteristics of the problems determine whether the participants will succeed or fail. Research on athletic achievement, on the other hand, cannot be done in the laboratory because there is no way to make a laboratory resemble a playing field or court. This fazed Stirling not at all. From the first conversation we had in the spring of her junior year, she had a plan. Initially she planned to test her hypotheses in a recreational summer softball league in her hometown in Connecticut. When that plan did not work out, she returned to Princeton in the fall and, in short order, got the winter girls’ basketball league in Dillon Gymnasium to agree to host the research. That kind of independence and foresight characterized the entire project.

So, what was my role in all of this? What kind of adviser did Stirling need? Different students need different kinds of advisers. Sometimes, a student needs a cheerleader, someone who will say, “You can do it.” Sometimes, a student needs a brake, someone who will say, “Slow down. You can’t just barrel along like that. You need to think more carefully about what you are doing.” With Stirling, I served as a cautionary voice, a kind of Greek chorus in the background; “Be careful,” I would say. “This is tricky. Watch your step.”

When I am working with seniors on their research designs, I encourage them to settle on designs that will not be plagued by the most common problems with which all researchers in psychology wrestle continually. I urge them to design studies that don’t take too long so that they won’t have difficulty recruiting participants. I urge them to design studies that make straightforward predictions about relationships between variables, so that the statistics will be equally simple and straightforward, and that have enough variables in them so that at least some of the relationships will be statistically significant. Stirling would have none of this. Her design was difficult and vulnerable; there were several points at which it could go completely wrong. First, she had to get enough children (and their parents and coaches) to agree to participate, not just once, but once a week for six weeks. Then she had to learn the statistical methods that would let her
analyze these longitudinal data and that would let her see if the interaction that she predicted actually appeared in the data. Stirling’s basic predictions were that children’s positive and negative affect, their level of self-esteem, and their desire to continue to be involved in the sport would depend on the combination of their goal-orientation (mastery or performance) and whether their team won or lost that week. The statistics required to test these hypotheses are quite advanced; certainly they are never taught in undergraduate statistics courses. Undaunted by my cautions and warnings, Stirling recruited participants and maintained a reasonable-sized sample over the weeks of the study. She then set about learning the statistical techniques she would need. Watching Stirling discover that she could ask questions in words and answer them in numbers was pure pleasure. She looked at her data from every angle and, as far as I could tell, enjoyed every minute of it.

Many years ago, in a small town in Connecticut, I was talking with a group of high school juniors and seniors about Princeton. In my remarks I emphasized the role of independent work and the senior thesis. It was immediately clear that these high school students were having trouble imagining that they could do a year-long project whose conception and implementation depended more on them than on the teacher, with a final product that could be 80 to 100 pages long. One of the students voiced this concern and asked me to describe the process of doing a senior thesis. When I was done, there was a pause, and then she said, “I see. It teaches you what it feels like to be an expert in something.” In all the years since, I have never heard a better summary of what doing a senior thesis accomplishes for Princeton undergraduates.
What is the difference between a mugger and a tax collector? Both want your money; both threaten violence if you refuse. The tax collector says he is enforcing the law, but that doesn’t answer the question. The question has to do with what difference it makes that the tax collector has the law on his side. Is it that the legal norm asserted by the tax collector can be justified by an appeal to objective moral truths? Or is the difference just that the state (acting through the tax collector) happens to be much more powerful than the mugger?

My thesis begins with the observation that many people who think about law are terribly anxious about these questions, and ends with the suggestion that they needn’t be. The springboard for my analysis was a case study: a comparison of Christian legal theory and the jurisprudence of Oliver Wendell Holmes. Because Holmes was an outspoken moral skeptic, his philosophy of law is usually understood as the very antithesis of the Christian legal tradition (which is supposed to assume the objectivity of moral values). My own take, however, was that Holmes shared much more in common with traditional Christian thinking about law than he—or those who study him—would tend to admit. I tried to show that Holmes championed an idea with deep roots in Christian theology: namely, that the existence of law presupposes the badness—the moral imperfection—of human beings.

The next step was to contrast this idea with my understanding of the classical rabbinic view that law would be necessary even if all people were angels who never got in each other’s way. From the rabbinic perspective, law originates not in the practice of managing unruly behavior, but in the practice of sorting particular concrete phenomena into general abstract categories. I noticed that the rabbis—unlike Holmes and his Christian rivals—seemed able to bypass the question of whether legal norms could be grounded in appeals to an objective moral reality. This made me wonder if all the anxiety over justifying the authority of law might be contingent on the assumption that legal norms exist in anticipation of their transgression. I concluded that if we give up that assumption—if we understand law not in terms of social control but in terms of the human practice of classifying things—then we will have less difficulty making arguments for the validity of our normative commitments.

I use the term “concluded” here rather loosely. For there was nothing “final” about the last draft I submitted of my thesis. I still think about the strengths and weaknesses of my analysis, and my thinking is very much in flux. Even in drafting the foregoing synopsis, I couldn’t help but wrestle with new and familiar objections to my reasoning. I am certainly pleased with what I accomplished senior year; but several months later, I still regard the questions that motivated my thesis—about how we ground legal authority and how comparative theology bears on the problem—as open questions.
If you had told me when I was a junior that I would forever see my thesis as a work in progress, I’d have been sorely disappointed. At that time, I had a sense of the thesis as a kind of grand finale to my academic program—a culmination, a conclusion, a resolution, a period. I’d have thought that a thesis which leaves any loose ends—a thesis that does not exude finality—had somehow missed the mark.

Of course, we don’t have such expectations of ordinary coursework. We are well aware, whenever we’re writing a term paper for a class, that the paper does not represent our last thoughts on the matter. We know that our efforts are subject to time constraints, that we are familiar with just a small fraction of the relevant sources, that a good term paper can be, at best, the beginning but not the end of a worthwhile scholarly project. We are well aware that our arguments are conditioned by our knowledge, circumstances, and experience up to that time and that those conditions are all subject to change.

One of the most valuable lessons I learned in writing my thesis is that these constraints—and the loose ends that come with them—don’t go away just because you’ve had a full year to immerse yourself in a topic. By the time I had “finished” writing, I’d realized that theses are in a crucial respect just like ordinary coursework: The goal cannot be to “get it right,” if getting it right means having the last word. At best, the goal can be to have good reasons—given what one could know at that particular moment—for one’s claims. Finality, I realized, is no more a virtue of the thesis than of the term paper.

This isn’t to deny that the thesis may be, for a number of different reasons, a unique academic and personal experience. If you are as lucky as I was, for instance, you will have an opportunity to work with an adviser who challenges and encourages and educates you all at once. I had taken Professor Eric Gregory’s “Christian Ethics and Modern Society” as a freshman, and my thesis was very much an attempt to extend the kind of dialogue between theology and moral philosophy that Professor Gregory had modeled so effectively in that course. I thus had the good fortune of working under the supervision of a true mentor.

For that matter, I had the benefit of support and guidance from my entire department: from our departmental representative (who helped me get summer research funding) to my fellow religion majors (we all met a couple times for Chinese food during a thesis-heavy spring break) to my second reader (who had been my JP adviser and my teacher in a freshman seminar called “Religion and Law”) to the department staff (whose inevitable “deadline reminder” e-mails were, somehow, gently motivational). Nothing strengthened my sense of identity with the department—its people and its mission—so much as the thesis.
The thesis also afforded me a unique opportunity to conduct field research. With the help of my departmental representative, I formulated a plan to spend the summer before senior year interviewing pastors about the implications of biblical teachings on law for contemporary legal systems. My thesis itself would remain within the abstract/theoretical mold of my previous work, but my hope was that this small taste of empirical research would help frame my arguments in a way that responds to actual, real-world concerns.

Undoubtedly, experiences like these all make the thesis special. But even more crucially, it was the thesis that helped me discover that no project—no matter how special—can or should be approached as a “grand finale.” In working on my thesis, I learned a great deal about Holmes, Anglo-American legal theory, and Christian and rabbinic theology. But a few months removed from the process, I can see that I learned even more about the open-endedness of thought and argument.

Eric S. Gregory
Assistant Professor of Religion

Thesis advising is special for three reasons. First, it provides the opportunity for sustained and, at times, leisurely engagement with an individual student doing highly original work on an important matter. Second, listening and responding to the emerging work transforms the student-teacher relationship into one of mutual inquiry led by the student. Third, this mutual inquiry can give rise to that unique bond of affection made possible by intellectual satisfaction. In the best situations (as with Jeremy), all three things happen.

Jeremy first came to my attention as a freshman. One of my preceptors forwarded me his papers because of their independence and their excellence. Many students find it difficult to discuss moral and religious issues in an academic setting that is both pluralistic and adheres to the standards of the study of religion as a humanities discipline. Jeremy was already an exception. It was my good fortune that he decided to major in religion and to write a thesis in an area that I thought I knew something about: the intersection of theology and legal philosophy. In our first formal meeting of the year, I came prepared with a number of secondary sources. Alas, he had read most of the significant literature. He had a better sense of how to approach his topic than any thesis writer I have advised. In fact, Jeremy had about three or four theses swimming in his head. He was prepared to write each of them.

Jeremy had spent his summer interviewing pastors about the various senses of “law” in the Bible and their popular application in the contemporary legal scene. He also had read quite a bit about heated debates concerning Paul’s account of Judaism and law in the New Testament. But Jeremy knew he had to start writing. He decided to follow his philosophical passions and abandon most
of his strictly ethnographic and historical ambitions. That kind of decision can be the most difficult and the most necessary. The result was his award-winning thesis.

Jeremy and I met regularly in my office to discuss both substance and style. He would submit a piece of writing to which I would respond by e-mail. He would then come prepared to defend his claims, clarify distinctions, and consider alternative readings. We explored aspects of Augustinian and Lutheran theology, contemporary epistemology and metaphysics, and the relations between law and coercion. On more than one occasion, Jeremy taught me about the distinctiveness of Jewish theology in light of our common interests. Along the way, we talked about Darfur, Iraq, military service, law schools, American pragmatism, and the sorry state of the Washington Redskins.

The thesis displays many scholarly virtues. It is philosophically mature, charitable in its presentation of opposing views, and original in its readings of multiple sources. Jeremy defends a bold argument about the contingency of Anglo-American law: secular and religious arguments over “law as power” and “law as truth” share an implicit assumption that is characteristic of a massively influential view of Pauline Christianity. The assumption is that law is essentially defensive restraint that anticipates criminality. In this view, “sin” or its secular analogue is logically prior to law. In particular, Jeremy argues that Oliver Wendell Holmes—usually taken as a preeminent legal realist, moral skeptic, and hostile secularist—is an unwitting proponent of Christian jurisprudence. Without sacrificing rigor or attention to secondary literature, Jeremy put this provocative claim in the service of two other dissenting proposals: a) an alternative legal theory based on the taxonomic approach of halakhic models in rabbinic Judaism, and b) a pluralist approach to the nature and function of law that avoids conceptual dead-ends which rely on misguided debates about moral skepticism. In short, Jeremy tries to deliver legal theory from the tragedy of a false choice between might and right.

No lightweight topics here! It is rare for a single work to join basic yet demanding themes in religious studies, jurisprudence, moral philosophy, and theology. Jeremy did so with historical integrity and analytic acumen. But the greatest strength of the thesis is its avoidance of academic jargon. He was able to capture difficult ideas in clear and elegant expression. I encouraged Jeremy to send his thesis to one of the foremost scholars of religion and law in the United States. That scholar thinks a version of the thesis should be published.

Good theses are all alike; every good thesis is good in its own way. They should avoid clichés and clumsy allusions to Tolstoy. But some clichés, at least, are true. Get started early. Make your topic manageable. Take full
advantage of Princeton’s intellectual and financial resources. Ask a question worth asking (and one that you passionately think is worth asking). Build on your own particular gifts and academic background. Be willing to let parts of the thesis go. And, usually before you think you are ready, put down the books and write.

I still remember Jeremy’s speech when he accepted the Pyne Prize, listening intently as a proud adviser from a proud department. Jeremy had another lesson to teach his teachers and friends. The words do escape me but not the sentiment. Jeremy closed his speech with an invocation of Socrates. But he added a twist to the old-fashioned critical pursuit of the true, the good, and the beautiful. Sometimes, he mused fittingly given the goals of his thesis, it is the conversation itself that matters. I remember and treasure our conversations. I look forward to continued travels with a fellow scholar and friend; indeed, I expect another e-mail draft.
My senior thesis began long before I knew it, in the middle of an intriguing discussion in a class called “Genres of Rabbinic Literature” with Professor Peter Schäfer in the fall of my junior year. We were debating the interpretation of a second-century C.E. Midrash (rabbinic commentary) on the biblical Book of Exodus when Professor Schäfer mentioned the possible use of the literary devices of irony and humor by the ancient authors. After quickly jotting down the idea on the margin of my notebook, the lesson continued, and only several weeks later, as I searched for a seminar paper topic, did I rethink the text we had analyzed in class.

The finished paper remained hidden in one of my computer files until I began to think seriously about my thesis at the beginning of my senior year. The prospect of finding a new topic and beginning to research texts with which I was not at all familiar seemed too daunting a task for one short year, and so I thought it wise to return to the ideas of irony in rabbinic literature that I had so briefly explored in my previous paper. After meeting with my adviser to concretize my plans, I decided to write my thesis on the very short introduction with which the rabbis open their long commentary on Exodus.

I found that researching a topic and a text about which I had thought before was extremely helpful in defining the scope of the paper and allowing me to begin the process with a specific focus and a clear direction. Additionally, picking a topic about which I was passionate, and that was both confined enough to manage and yet also related to many larger questions in the field more generally, was an important first step. I was fortunate to have an adviser, Professor Schäfer, who helped me to narrow down my topic each time it began to grow. Indeed, throughout the entire process I am about to describe, Professor Schäfer inspired me with his wisdom and insight, always willing and excited to discuss the progress of my project and to prod me to deeper and more significant conclusions.

After I had chosen my text (Mekhilta de Rabbi Ishmael), I read it countless times in order to become familiar with it. I then read related primary and secondary literature on the specific text, on the genre of Midrash, on the history of the period and the role of the rabbis during that time, on modern literary theory as it relates to Midrash, and on irony in the ancient world and in modern literature. Bibliographies and footnotes often directed me to additional sources when I ran out of ideas myself. During this period of reading, I gained a background in the topic, I became familiar with different approaches and methodologies that had been applied in previous scholarship, and I began to formulate my own methodology that incorporated what I had learned while simultaneously trying to contribute something new to the body of scholarship already produced. I finally decided to approach the text from three angles—as a commentary trying to interpret a specific biblical passage, as a literary-historical work that attempts to assert...
its own perspective amidst a real historical context, and as a self-conscious reflection on the process of interpretation itself.

With this framework in mind, I constructed an argument (a thesis!) around my primary text. This, of course, was the most challenging yet also the most crucial part of the thesis-writing process. Ultimately, the thesis must be structured such that it answers difficult questions with a persuasive argument. I do not mean to suggest that one may only begin writing once one has arrived at final conclusions about the questions motivating the research; this was certainly not the case for me. I began the first draft of my thesis with a few ambiguous and amorphous hypotheses. These hypotheses were critical not because they formed the basis of my ultimate conclusions, but rather because the hypotheses helped lead me to the conclusions, even if the latter entirely contradicted the former. The very act of having to work through the argument in writing allowed—indeed, required—me to refine and strengthen the argument: I saw the kinks in my reasoning much more clearly in print than I was able to when the ideas were merely swimming around my mind. To summarize, then, up to this point: My primary text engendered questions, which, through careful reading of other primary and secondary literatures, led me to hypotheses, which were modified, corrected, and fortified by the act of writing.

After I wrote parts of my first draft, I began the editing process, which, after beginning to write, was the most demanding of all the tasks involved. I restructured my thesis each time my argument shifted or my sources directed me in new ways, and this took much more time than the actual writing. What began at the end of the thesis became my introduction, and what originally was at the beginning found its way into the middle of the second chapter. I not only edited the structure countless times, but I also tried to improve my style of writing and clarify my various points. I found that when I became frustrated with everything else, I could always take a break for a few days and enhance my writing. Finally, I spent many hours proofreading my thesis to reduce embarrassing typos and silly mistakes. All this takes a lot of time, and so it is crucial that one begins writing early enough to leave oneself enough time to edit, edit, and edit some more.

In fact, my editing did not end on the thesis due date. Rather, even as I submitted my “final” draft, I recognized that there remained unresolved questions about my primary text. Such lingering questions, I would propose in conclusion, should not be considered as an indication of any failure in your thesis experience. After all, there will always be outstanding questions about any phenomenon, no matter how well researched and treated. These questions are rather a sign that you have retained your interest in the material over the course of a grueling year. In preparing for my thesis defense several weeks after I submitted the final draft, I thought of a new answer to one of my enduring questions, an answer that substantially affected much
Peter Schäfer  
Ronald O. Perelman Professor of Jewish Studies  
Professor of Religion

Writing a thesis is certainly not peculiar to Princeton—so what is “quintessentially Princeton” about it? I have had the pleasure of supervising such (or similar) theses at several universities in several countries and thought, when I came to Princeton in 1998, that I knew more or less all one could know. Well, one of the first lessons I was taught was that I was wrong—and probably a bit too self-confident and experienced in my attitude. I have always been a fervent follower and defendant of the old Humboldt ideal of the unity of teaching and research—of the university as a place of mutual exchange between teachers and students as equal partners, as probably the only place that still exists where students and teachers can learn together in the original sense of the word and reach conclusions that neither of them was able to predict. Yet nothing prepared me for what I was up to when I arrived at Princeton.

This is not to say that all senior theses at Princeton are extraordinary and that supervising them is always sheer pleasure. Unfortunately, this is not the case since there is no Paradise on earth any more, not even here. But Princeton comes closest to it, at least from the universities that I have seen. Writing and supervising senior theses is the most demanding and exhausting exercise that the undergraduate experience has to offer (students generally underestimate the degree of exhaustion to which they drive their professors if both do their job properly). For it is essentially different from writing and supervising doctoral theses; whereas graduate students are supposed to prove that they finally are capable of following their own interests and pursuing their own work—the support and gentle guiding hand of the supervisor notwithstanding—the undergraduate student needs much more than that. To begin with, it is the professor’s task to find out, together with the student, what the subject might be that serves the student’s interest best, that elusive subject that makes the most of the student’s potential.
And then the student and the professor need to work together, not infrequently fight together, and shape a thesis that is the best possible result this particular student is capable of achieving. This is not to say, of course, that the professor is ultimately responsible for a bad thesis or a student’s failure—it goes without saying that also the undergraduate student’s thesis is his or her own thesis—but it is the professor’s responsibility to bring out the very best of each student, and I have always felt that a bad thesis is in some way also my failure.

Sarit’s thesis obviously does not belong to the latter category; in fact, it is one of those theses that make me proud of being part of the Princeton experience. I had known Sarit from several courses that she took with me, and I had already had the pleasure of supervising her junior paper (more precisely one of her junior papers, because in her insatiable curiosity and energy she chose to write two junior papers, one in religion and one in Near Eastern studies: I would rather not want to speculate about what might have happened if Princeton allowed its students to write also two senior theses). Her junior paper in religion was on the golem (that famous artificial creature that originated in the Jewish mystical tradition and made its way into legend, literature, and art) in German romanticism of the 18th century—not an easy subject because it requires, among other things, a sound knowledge of early modern German. Knowing Sarit and her interests as well her talents, I wasn’t particularly surprised when she asked me whether I would also agree to supervise her senior thesis.

In Sarit’s case, it wasn’t difficult at all to find a subject. We immediately agreed upon a passage from a famous Midrash (that is, a rabbinic commentary) on the biblical Book of Exodus. The commentary was presumably written—or more precisely edited—some time in the third century C.E., and it begins with Exodus 12, the chapter that details the biblical instructions regarding the Passover lamb. Hence, it is quite an important chapter in the Bible, but the verse that the introductory section of the commentary elaborates upon at some length (Exodus 12:1) couldn’t be less conspicuous. It simply, and rather boringly, reads: “And God spoke to Moses and Aaron in the land of Egypt saying.” The commentary on this verse has been well known as one of the typical exegetical exercises of the rabbis, in no way peculiar and certainly not particularly exciting. Yet what Sarit did with it in her thesis turned out to be thrilling and, moreover, highly provocative. She makes clear that the rabbis in their anything but boring exegesis not only threw Aaron out of this verse, boldly claiming that he didn’t belong there (obviously against the literal sense), but that they did so on purpose because they wanted Moses alone (and not Aaron) to be the recipient of divine revelation. Why? Because they wanted to state, against the grain of the biblical text, that Moses was more important than Aaron, the recipient of revelation more important than the progenitor of the priests. In other words, it is the professor’s responsibility to bring out the very best of each student...
since the rabbis regarded themselves as the heirs of Moses and divine revelation, their exegesis in the introductory chapter of the Midrash is but a sophisticated piece of rabbinic propaganda. Or, to put it differently, it is a declaration of war against the priests, telling the rabbis' audience that the time of the priests is finally over and that now the rabbis, with their interpretation of the Bible, are the true guardians of the Jewish religion.

So what did I learn from this experience? I clearly had an idea of the direction into which Sarit’s research would lead her—in fact, I have been teaching this text in my “Introduction into Rabbinic Judaism” course for a while—but Sarit has moved far beyond the scholarly consensus about this passage and what it tells us about the rabbis and their claim to power. First and foremost, she has firmly put the Midrash into the historical context of the consolidating rabbinic movement of late antique Judaism, vis-à-vis the emerging competing religion, Christianity. And second, she has applied for the first time to rabbinical exegesis modern literary theories about the use of irony in religious discourse. This latter approach is particularly promising because it opens up a completely new field for future research.

I keep a section in my library in which I collect all the B.A., M.A., and Ph.D. theses that I have had the pleasure (or burden) to supervise. Naturally, this section has grown considerably over the years. Quite frequently I am happy to throw away the manuscript of a Ph.D. thesis because it was later published and can be solemnly placed in the section of published books. Sarit’s thesis is the first senior thesis that, even though still a manuscript, is kept in this section of published books.
I know many of you will read the title of my thesis and will probably be as confused as I was when I started my senior thesis: What in the world is a quasi-chaotic trace gas sensor? How am I ever going to make such a thing work? My tools for trying to answer these two questions pretty much lay in the two most precious resources for starting a senior thesis—a quick literature review (with the help of Google) and, of course, my adviser.

My project basically involved designing and building a device to be used as a sensor for identifying various unknown gas samples. The sensor was made of two components: a light source and a cavity for temporarily trapping light. The cavity enabled the storing of a gas sample and the temporary confinement of a laser beam through multiple reflections. The term quasi-chaotic referred to the special geometry of the cavity. By comparing the laser light before and after it passed through the gas sample, one could possibly identify the unknown gas sample. Given the specific geometry and compactness of the cavity, one could imagine very portable and robust sensors for environmental monitoring or even medical applications.

My work was the continuation of a previous senior thesis that had analyzed the geometry of the cavity and completed some initial feasibility experiments. My job was to use various techniques (simulation, machining, designing optical systems, writing LabVIEW software) to actually make the thing work. I chose this project because, as an engineer, I could not resist an opportunity to get my hands dirty and build something while learning new things as well as applying old things from classes I had taken in optics or electronics. It was a project where, at the end, I would have something very concrete to demonstrate—ideally, something that could potentially benefit others. This project was the epitome of the engineering mantra: design, simulate, build, experiment, and repeat. It allowed me an opportunity to design 3-D ray tracing software for simulating beam paths in the cavity. It also allowed me to play around with an optics bench, which is like Legos for adults. Finally, I was able to design and build my own setups for running experiments, including designing various automated systems. At the end of all of it, I was pretty amazed at how much I had built and gotten up and running.

Personally, I found senior thesis work a nice change of pace from rigorous, structured engineering classes, where the pace is defined by weekly problem sets. I had more freedom to allocate and budget time, in part because I started the project in the summer before my senior year. In retrospect, this was a wise choice since a lot of the initial work required large chunks of dedicated time—for example, literature searches and getting familiar with the equipment and the layout of the lab. The more time I spent getting acquainted with the lab and the project, the less anxious I became about tackling my senior thesis. In addition, the extra time during the summer allowed me some breathing room in case of unexpected problems,
and it gave me some space to create a general timetable for the various parts of my project.

Usually, we are accustomed to having a professor tell us when various problem sets and quizzes are due; however, with independent work, there is no one monitoring your work every day, which in some ways is more freeing, but also more dangerous if one starts procrastinating. Working on my senior thesis taught me a lot about how to make personal milestones and make sure things got done. This meant realizing what tasks had to be done that week and also coming up with new tasks to accomplish on my own. Initially this was difficult, but at the end it became very natural. I started by setting small goals for myself like trying to fully understand papers from my literature review to eventually setting up more specific goals, such as simulating the cavity or designing and implementing a system for automatically collecting data from an oscilloscope. What was truly empowering was that as I got more and more involved with the project, the easier and easier it became to identify what needed to be done and what things I should try. Fortunately, if I ever did feel unsure about what I was doing, I could always talk to Professor Claire Gmachl.

It may seem a tad intimidating working with someone who is a "certified genius," but choosing her as my adviser was probably one of my best choices right next to choosing to attend Princeton. My interaction with Professor Gmachl was nurturing enough to gently nudge me in the right direction without smothering me with demanding deadlines. I never felt intimidated to ask dumb questions or just brainstorm ideas with her off the top of my head before I really thought about what I was saying. In addition, she genuinely cared about my progress and about me, providing advice not only on my project but about career plans and recommendations about graduate school and fellowships.

All of this praise is not to say that everything went smoothly in this project. The senior thesis, at least from an experimental side, is a different type of stress that sometimes can haunt you at night as to you try to figure out what went wrong with your experiment or what to do when the experiments fail. There is no textbook answer or someone who knows what to do, because that’s your job. It is difficult but also immensely rewarding when one actually overcomes those problems. Generally, it’s a combination of one’s own drive and maybe a little bit of luck to finally get results, but it’s something at the end of the day that you can call your own little victory. It’s amazing how wrapped up one gets in the senior thesis. I can distinctly remember going to classes only to hope for them to end so I could go back and finish building the next part of my project or run the next part of my experiment. As for the actual process of writing up the thesis, for engineers it’s the same as writing up an extensive lab report, except after spending so much time with the project, it’s almost like writing up one’s diary for the year. From the
senior thesis, I learned lots of valuable skills and gained lots of experiences that have proved useful in my current life as a graduate student. It’s very easy to get lost in a sea of choices and decisions without any clear path to guide you. But after completing a senior thesis, I feel as though I have more confidence for tackling those decisions and choices, which should prove useful in four to five years when I have to do this all over again to write my doctoral thesis.

Claire F. Gmachl
Associate Professor of Electrical Engineering

How does one start a new field of research? How does one take an idea that’s really “out there” and test it out safely without betting anyone’s career? There’s no formal or substantial research funding yet available, and to be successful the idea in its execution needs constant and rapid readjustment and the best and brightest mind to work on it, an intellect entirely unfazed by the magnitude of the proposition. Where do you find someone with near unlimited bandwidth and the confidence to get it done—whatever “it” may be?

These are questions that I frequently encounter as a researcher, manager, adviser, and group leader in electrical engineering; in the Princeton senior thesis and Princeton seniors I have found one perfect answer.

In original, high-risk, and high-reward research, success can hardly be timed. Therefore, a senior thesis is less about obtaining a specific result than about the process of developing a new research direction and breaking the first ground in the unexplored “jungle” out there, all in keeping with Alexander Graham Bell’s exhortation to go off the beaten path and delve into the woods and one will be certain to find something new. I find this to be quite accurate, and much more often than not there are new knowledge and opportunities to be found off the safe and trodden paths.

Yet, one needs the best expedition partners on this journey. Who better than Princeton seniors? Princeton seniors at the top of their class are essentially “off the charts” intellectually and in what they can achieve in the limited time of the senior year. This then is what I like best about senior thesis advising, the intellectual partnership with an outstanding student and the ability to accomplish a significant piece of work in a relatively short time. The thesis is usually the start of something new: a potential new research direction for the adviser, and the transition into the independence of original work for the student.

Allen Hsu, in developing his senior thesis on a quasi-chaotic optical trace gas sensor, was a perfect example of all of this. Above all, working with Allen was an intellectual partnership, quite different from the instructor–student relationship that characterizes usual lecture courses and labs.
Allen brought with him the entire breadth of his almost four years of engineering education at Princeton, his knowledge and skills in fields as far apart as theoretical optical modeling, programming of microprocessors, and hands-on machine-shop work. Allen also brought with him the motivation to do his very best at his senior thesis. I brought in a rough notion of an idea and some specifics of how to get it started.

Throughout the process he impressed me with his independence. For example, he and I would discuss his project regularly, usually late in the evenings or on weekends, his preferred times of working in the lab, by him asking questions, voicing concerns, drawing up plans, and presenting data. Allen was clearly not looking at me as a source of answers, but he was using me more as a sounding board for his ideas, and would take my input as a second opinion and as a reality check for his ideas. Similarly, I would mention ideas to him, knowing well they would stay with him, grow, and—if they were good ones—be implemented in due course.

The second most rewarding aspect of a senior thesis—and in particular of Allen's—is the fact that a significant piece of research work can be accomplished. Allen demonstrated the suitability of quasi-chaotic optical cavities for the mid-infrared wavelength range by performing run-time measurements to determine the optical path lengths and beam attenuation in the cavity. This is an absolute first. Allen then applied this new-found knowledge to assemble a trace-gas sensing system built on this new type of optical cavity. The work is currently in the process of publication in a high-level, peer-reviewed journal and has been submitted to the premier conference in the field.

The results of Allen's work are so promising that a long-term commitment to the project through graduate students and research funding is now justified and feasible; i.e., Allen's thesis truly started a new research direction for my group!

Several features of the senior thesis make it different from the usual teaching, coursework, and graduate student advising. On one hand, I've repeatedly observed that Princeton seniors take enormous pride in writing their senior thesis and in working extremely hard at it. I sense that seniors also have a different perspective from other students that comes both from looking ahead to their next career step and the deadline pressure of finishing up at Princeton. Senior thesis advisers are the beneficiaries of the resulting extra effort, motivation, and drive.

My advice to juniors and seniors contemplating their independent research work is to look at the senior thesis more as a process and a start of something new than the need to produce a specific result. Worthwhile research rarely knows precisely where it is headed. One needs to be willing to take the risk and to be bold and dream. If you or your adviser already ...

... a senior thesis is less about obtaining a specific result than about the process of developing a new research direction and breaking the first ground in the unexplored "jungle" out there.
know the answer, move on to something new. It’s quite all right if the adviser also doesn’t know the answer; they may have more experience in seeing patterns and interpreting results though, so it is important to stay involved. Remember to treat it as an intellectual partnership, rather than the usual student–teacher relationship.

Finally, a professor’s reward in supervising a senior thesis also comes from having been part of the student’s education at Princeton. I hope that to some extent Allen’s work in my group and laboratory shaped his interests and strengthened his abilities. I am confident that in due course he will go on to become one of the stars of engineering. Having been part of this and looking forward to more theses like Allen’s is my reward in advising senior theses.
My not majoring in English as an undergraduate was actually supposed to be a form of protest. Protest against what? I don’t really remember now, but I think it had something to do with the idea that, in order to be a good writer, you first and foremost had to be a good reader—which I thought was complete crap. In order to be a good writer, I believed—with all my sophomoric heart and soul—you first and foremost had to be a good person. You needed insight into people and society and yourself and what makes things tick. In order to create another world—whether it be on a page or on a stage—you first had to make the attempt at understanding the mechanics of the world you were already stuck in. Which is why I majored in anthropology—the study of man, the study of culture, the study of being in the world.

This was, perhaps, one of the best decisions I’ve ever made.

What I unfortunately failed to consider, however, was the fact that most anthropologists don’t usually wind up writing plays for their senior theses, nor do they tend to have any interest in doing so. A dramatic script was a far cry from a traditional ethnography—even though you could mistake one for the other, in the dark, if you squinted a little. For a few months, I was at a loss for what to do. I’d come to Princeton knowing that, in end, it was crucial that I walk out with some sort of substantial creative work under my belt, but how could I reconcile this with my academic choices? Should I just do a traditional anthropology thesis, and forget what I ostensibly came to Princeton to do (write)? Should I do—God forbid—two theses? Should I switch my major to English at the last minute? Should I just cry a lot and hyperventilate?

Then, of course, it was announced that August Wilson—perhaps the most important African American playwright of the 20th century—was dying of liver cancer. This was in the spring of 2005. The news of this didn’t hit me as hard as I would have liked, but I didn’t take it too lightly either. Instead, it was something in between, something like a haunting, that I could feel hanging over my head or constantly walking two steps behind me, something I think a lot of minorities working or aspiring to work in the American theatre at that time must have felt. In a frenzy, I began reading everything by Wilson that I could get my hands on and suddenly found myself in this strange love-hate relationship with him. I won’t go into too much detail as to why, but Wilson had ostensibly opened up a very large door for African Americans in the past few decades and it seemed to me that there was a general anxiety—on the part of everyone working in the American theatre—about that door closing upon his death. But what was this anxiety? Where did it come from? Could Wilson himself be, in any way, contributing to it? Were there any ways in which it could be assuaged?

Then I came across a passage in one of Wilson’s introductions, in which he described his task as a dramatist as “writing about the African-American
experience with an ‘anthropological eye.’” Suddenly, my thesis was clear. I was going to try and find out what this meant. What did it mean to write a play with an “anthropological eye?” Whose “eye” was this? And what was the impact of such a play and its possible shortcomings on the American theatre itself with its predominantly white majority patronage? How can one write plays about black people for black and white (not to mention Asian and Latino) audiences? And, more importantly, why exactly would you want to?

At first, I was extremely nervous about what I thought I wanted to do. I didn’t think there would be any chance that the anthropology department would want to share a thesis student with the Program in Theater and Dance. Luckily, I was totally wrong. Surprisingly, both parties seemed generally intrigued at the prospect of working together through me. As a sort of bonus (or torture, depending on when you asked me) I was assigned two advisers—a playwright and an anthropologist—and a lot of support. This interdisciplinary approach, I believe, is what enabled me to have as rich an experience as I did, writing and directing HEART!! Not only did I receive a full professional production and a standing ovation on three nights, but I felt as though I was beginning to answer some crucial questions that plague me even today. And this is, for me, what the thesis should quintessentially be: a melding of one’s passions and one’s mind, taking advantage of this incredible opportunity to make a difference with something you care about.

Of course, the thesis isn’t always a super-pretty, fun-loving experience—especially when it’s something as time-consuming as a full-scale theatrical production—and anyone who tells you otherwise is a liar. There were times when I woke up in a strange bed and realized I’d fallen asleep on my own set. I literally must have paid out a fortune in coffee money to the U-Store. For a while, I’d forgotten what a shower looked like, and one friend recently reported back to me that, when she once asked me how I was doing, I told her I thought my face was melting. So there was that. But you know what? That was fine with me.

At least I got it done, and at least I wasn’t an English major.

(For the record, I actually have nothing against English majors or English as a major. Some of my best friends are English majors and I took about as many English classes as I did anthropology classes while at Princeton. At the time of major declaration, I was just young, naïve, contentious, and trying to make a point. I don’t regret my decision, but there are times—mostly at night—when I wonder how my life would have changed had I gone a different route.)
At the start of each year I sit down with my senior advisees, and together we struggle to draw a road map to an unknown destination. Some students come prepared with data from summer fieldwork in exotic locales: Ghana, Belize, Washington, D.C. Others are just beginning to formulate their research topic. Most have never designed or executed an original research project on the order of their senior thesis. The nice part about the initial meeting with each student is that what they lack in experience they more than make up for in enthusiasm.

With Branden Jacobs-Jenkins my advising experience differed. Branden chose to write and direct a play. In anthropology we allow students to combine an art or visual project with a written analysis of that project for their senior thesis. Art employs meaningful cultural signifiers, making it ideal for anthropological interpretation. Branden worked with theatre professor R. N. Sandberg to produce HEART!!!, a comedy examining the life of a lower-middle class African American family. The central character, Randall, is a student in a predominately white college. The story takes place when Randall returns home for a visit and the audience witnesses how torn he is between his family and his growing self-awareness.

Branden titled the analytical part of his thesis “On the Writing of HEART!!! as an Anthropological Venture or Notes Toward Writing Plays About Black People That Black and White Folks Will Want to See.” His analysis can best be described as an excellent meditation on race consciousness in theatre. Meetings with Branden generally involved discussions of race, representation, authenticity, and issues he had with his cast and their interpretation of his play. “Should I rewrite the ending?” he asked me two weeks before the opening performance after a member of the cast said that she did not think the play was about race. I read the play and realized that Branden had written a spectacular piece of theatre. What Branden needed was an audience in order to see if they “got it.”

For Branden, the question of audience, race, and how to disrupt audience expectations about race without “losing” them is an issue he has had to grapple with as a playwright. The senior thesis provided Branden an opportunity to experiment before he entered the professional world of theatre where the stakes are high. The results of this experiment are stunning. As Professor Sandberg notes below, there was nothing quintessential about Branden’s thesis.

Robert N. Sandberg
Lecturer in English, Theater and Dance, and the University Center for the Creative and Performing Arts

Branden took my playwriting course his junior year. His writing was—well, frankly, astounding. He wrote five plays, each distinct, each filled with captivating characters in a unique world, unfolding in strikingly theatrical ways. And these plays
seemed to spring effortlessly from his imagination fully formed. I was thrilled with the thought of working with him on his thesis play. He was a real writer with something to say and a huge range. That range, however, didn’t include dealing explicitly with African American characters and themes. His thesis play was to confront the experience of the contemporary African American family head on.

Making the leap from course or independent work to a thesis project that is three, four, five times the length or more is a daunting prospect for most students. I didn’t think that would be an issue for Branden. He’d turned out a brilliant 50-page play in one week. I thought writing a full-length would be a snap for him. He was filled with enthusiasm for and ideas about this family play, *HEART!!!* But right from the beginning it was a struggle. Through September and early October, each pre-meeting e-mail began, “I know this is disappointing. I’ve only got five (or eight or four) pages.” But right before fall break, pages started to tumble out faster and faster. He had a first act and it was like no play I knew—funny, wild, wise, farcical, absurd, dangerous, and heart-breaking. And then—he couldn’t go on. He had no idea what the second act was or where it was going. He stopped writing. This play, at least. He began to write a totally different one, a play called *ZOO*. He wrote 80 pages in about 10 days! And miraculously, all of a sudden, he then could write *HEART!!!* again. Four months later, after numerous rewrites and a grueling rehearsal process, *HEART!!!* opened to audiences exploding with laughter, shouting with the joy of recognition and resonantly silent as they ached for the family Branden had created in *HEART!!!*

Writing a thesis, whether it’s a play or academic essay, isn’t the sprint of a course paper. It’s a marathon. That’s its challenge, pleasure, and reason for being. The writer comes to understand what a significant piece of life work feels like. The initial enthusiasm, the day-to-day struggles of failure and exhilaration of breakthroughs, the utter exhaustion of a large task, the amazement at this substantial project that you hold in your hand, that YOU have created. For even the best of students, it’s rare that the process is smooth and rarer still that the journey doesn’t bring a sense of accomplishment like none other they’ve experienced. It’s empowering. You know you can take on what life in the real world has to offer. Even, perhaps especially, when it isn’t easy.
My senior thesis topic was Justinian’s laws against heresy and the closing of the Neoplatonic philosophical schools at Athens around 529 C.E. These schools boasted of an unbroken heritage going all the way back to Socrates. Although this claim was spurious, it shows the sense of worth that the schools had for themselves and which later writers ascribed to their closing. A long tradition of historians, going back to Edward Gibbon in his book *The Decline and Fall of the Roman Empire*, have thought that the schools were summarily closed by a centralized order coming from Justinian and that this closing was a highly symbolic part of his desire to Christianize his empire. By reconstructing the events, I showed that the situation was not so simple, and that local circumstances and tensions between pagan and Christian elements in and around Athens were probably more important than the laws coming from Justinian.

My senior thesis was a quintessential part of my Princeton experience. I was able to use the skills I had learned to do a significant piece of independent research. A sizeable part of my thesis was translating and commenting on about 10 pages of laws in Greek, and my classroom experience with Greek was essential in doing this. The training in closely analyzing literary and historical texts that I learned both in classics and in other courses at Princeton (especially the double-credit humanities sequence, which I highly recommend to underclassmen) was applicable to working with the primary texts I used. More generally, I was able to apply the historical methodology that I had seen in my previous courses and seminars to solve my own puzzle.

An exciting aspect of my thesis was that I was adding something to the scholarly discussion on my topic. My junior paper, on a different topic, included a long discussion of the trends of opinion in secondary scholarship on the very question I was asking going back to the 1800s. The controversy I addressed in my senior thesis, however, was born with an important article in 1969 and is still the subject of new books and articles today.

Aside from its academic aspects, writing the thesis was also an important personal process for me. Seeing the topic form and change was exciting, and the actual work was by turns rewarding and frustrating. It’s a lot more straightforward to answer a question on an exam than it is to come up with your own questions and answer them. The sheer size of a thesis project also brings in new possibilities and problems: A thesis might have three 30-page chapters, but writing them is different and in some ways more difficult than writing three 30-page papers for separate classes. Although I had the advantage of having a single general topic on which I could develop a level of expertise, the various topics of the chapters had to fit together into a larger narrative. It’s almost like having to paint on a canvas three times larger than one is used to. The sections of the large picture have to be as detailed and internally coherent as if they were to stand alone as their own.
scenes, but the sections have to create a larger picture. Like a blank canvas, an empty thesis binding is as daunting as it is ripe with possibilities.

Professor Christian Wildberg, my adviser, suggested this topic to me at the end of my junior year, but my plans for the thesis changed repeatedly. I had to learn not to bite off more than I could chew. I originally wanted to compare the philosophical schools in Athens and Alexandria and the law school in Beirut, and explain why of these three, only Alexandria survived Justinian. This was the proposal that I presented to the classics department in the fall, but I gradually realized that each of these examples could be the subject of its own thesis. First I got rid of Beirut, and then reluctantly discarded Alexandria around February. Although I don’t regret the time I spent reading up on these other two schools, and I believe my thinking about them helped give me a good perspective on the situation in Athens, I now wish I had narrowed the topic sooner.

Having a wonderful adviser was key to my thesis process. I met with Professor Wildberg every week or two to talk about how things were going. Early on, our discussions were more general and theoretical; later, we would talk about how my research was addressing more specific questions. Our ideas about the topic developed through my research and our mutual discussion, and I was able to bring what I had found and use him as a sounding-board for new hypotheses. It was essential that I was comfortable enough with my adviser to be able to go out on a limb during our discussions. If my daring hypothesis seemed promising, Professor Wildberg made me prove it to him and suggested where I could go further with it; if my daring hypothesis seemed weak, he said so. Most importantly, my adviser let me make mistakes. He guided and advised, but did not hold my hand or tell me what answer I should look for. The senior thesis invites the student to become an independent scholar, and Professor Wildberg treated me like a peer, a fellow scholar developing my own ideas rather than a student learning the ideas of others.

I was a member of the 2 Dickinson St. co-op during my last two years at Princeton. I learned to bake bread from scratch there, and I joked with Professor Wildberg that it wasn’t so different from writing a thesis. The dough has to sit while the yeast does its leavening, and then it goes into the oven. When I said this to my adviser, he said, “Yes, and I turn the heat up.” His friendly encouragement was definitely important, but writing my thesis taught me that I was the only person who could really set the temperature. Looming deadlines definitely made things pretty hot—the whole Princeton campus goes a little thesis-crazy once the snow starts to melt—but if I hadn’t been motivated by my topic, I couldn’t have sat myself down and written a thesis three times longer than anything I had ever written before.

...my thesis was the culmination of my time at Princeton.
In terms of academic development, my thesis was the culmination of my time at Princeton. It is not only an end, but also a beginning, introducing me to the field of legal history. Without the experience gained in writing my thesis, I would not have been able to pursue my current Fulbright project in Germany, which also involves analyzing legal sources from Late Antiquity. The academic achievement of creating an original piece of scholarship and the personal satisfaction of carrying out so large a task were well worth the work that went into writing my senior thesis. Although there were occasional setbacks and times when the task seemed almost too great to be done, my thesis turned out well, and I am even considering revising and publishing part or all of it. To those Princetonians who will write their own theses in years to come, I would say that the most important thing is not to be overwhelmed by the difficulties of the thesis process, but rather to be motivated and excited by its challenges.

Christian Wildberg
Professor of Classics

With the exception of the figure of Socrates, historians of philosophy rarely think about the social and personal circumstances of philosophers in antiquity. When, in the year 529, the Christian emperor Justinian attempted to eradicate heresy and, among other drastic measures, “closed the pagan school of philosophy in Athens,” historians tend to describe the momentous demise of pagan learning in just so many words. Yet, precisely how, on what legal basis, and through which executive channels did the emperor obliterate this peaceful community of private citizens cultivating the philosophical tradition (and practicing a little theurgy on the side)? What did it mean, in practical terms, for that small group of men to bury their gods in the crevices of their luxurious villas and flee, together with their households and treasure trove of scrolls, to distant Persia? These were questions that had fascinated me for a long time, and it always seemed to me that the episode deserved closer attention then it had hitherto received.

I had just been thinking again about these last pagans when Henryk Jaronowski walked into my office to discuss the possibility of a senior thesis. I had gotten to know Henryk over the previous year as a gifted linguist who not only mastered humdrum modern languages such as English, French, and German, but who was equally skillful in ancient languages such as Latin, Greek, Syriac, and Hebrew. He also harbored a considerable interest in the law (and is now working under the tutelage of a renowned legal historian in Munich). But above all, he had the right attitude, for he understood perfectly that, given the right amount of intellectual energy and effort, any topic would develop its profound fascination and reward. It did not take much to get him fired up about “529 and all that.”

The choice of topic was a happy one, as it turned out, because it built on strengths of this particular student. To my astonishment, Henryk plowed through
a labyrinth of late antique legislation and reconstructed the increasingly hostile trajectory of anti-pagan jurisdiction; he translated large swaths of impenetrable legal jargon in Greek and Latin and perused and compared little-known Byzantine historians and chroniclers; and finally, with Sherlock-Holmesian ingenuity, he pieced together a most comprehensive account of the twists and turns of those fateful months in the early reign of Justinian. Most importantly, perhaps, his retelling of the story has the virtue of making excellent sense of all of the legal and historical evidence still available.

Henryk ended up writing a fantastically interesting and sophisticated senior thesis from which I (and anyone else who read it) learned a great deal. Above all, it was brought home to me that the best prognosis for the success of a senior thesis is a passionate interest in the topic that is shared by both student and professor. Even if such a conjunction may seem serendipitous, it does not strike me as all that difficult to achieve. In the ideal case, I suppose, a senior thesis will teach the student what he or she is capable of, and that a new voice is ready to join the chorus of researchers and scholars contributing to our understanding of the human condition. And so it is my hope that Henryk's thesis will form the basis of his first major publication as a scholar; everything else aside, that would be a marvelous tribute to the many hours we spent together pondering the intention of Justinian's laws and parsing the gruesome grammar of late Byzantine chronicles.

... the best prognosis for the success of a senior thesis is a passionate interest in the topic that is shared by both student and professor.
I never imagined that the thesis process would come to an end until I walked out of Triangle on Nassau Street with a box full of copies of my bound thesis. It was over. Completed. I would never have to return to my dimly lit, faded 1960s lime-green, musty carrel on the third floor of Firestone. I would never have to produce yet another draft incorporating endless edits. I would never have to grapple with how to write my conclusion. The thesis, a being that lived with me throughout my Princeton experience, had officially shifted to the past tense. I could no longer say “I am writing on the relationship between fathers and daughters in three of Jane Austen’s novels” or that “I am trying to get through my third chapter.” Strangely, I must now refer to my thesis as a piece that “I wrote.” Yet, the euphoria (mingled with exhaustion) of the end stopped short of my expectations, of the fantasies I envisioned as I sat in Firestone trying to start my first chapter. While closing the literal and metaphorical book on my thesis was one of my greatest accomplishments, it meant that I would have to say goodbye to an endeavor that had become a living, breathing companion.

Little did I know that when I chose to spend the fall of my junior year in London studying English literature at University College London, I would thrive on Princeton’s philosophy regarding the curiosity inherent in independent work. Stepping into the setting, albeit over a century later, that produced writers such as Charles Dickens, Thomas Hardy, Charlotte Brontë, George Eliot, Jane Austen, and William Makepeace Thackeray brought literature to life in a way that I had never experienced. Reading the novels and writing a brief analytical essay no longer satisfied my curiosity. I wanted to know why Dickens was so harsh toward the mercenary character of Bella Wilfer in Our Mutual Friend, why we love to hate Thackeray’s Becky Sharp in Vanity Fair, and why every girl falls in love with Mr. Darcy in Pride and Prejudice.

I have always loved Jane Austen novels, from the first time I met Lizzie Bennet and Mr. Darcy in Pride and Prejudice at the age of 13. I would excitedly read whichever of her novels was assigned in my English classes and ardently defend Austen when my male counterparts dismissed and condemned her as trashy chick-lit. However, I never had the opportunity to explore all of Austen’s works as a unit. When I began to write my junior papers, the first of which I wrote during my time in London, I always had Austen and her novels in the back of my mind; yet, I knew that I needed more space and more time to explore her than in a semester-long, 20-page essay. She would be perfect for my thesis, not only because she was a fresh undertaking to be tackled, but most importantly because I knew I would never grow tired of reading and rereading, analyzing and re-analyzing her spirited narrative.

The summer before my senior year I assigned myself the task of reading all six of Austen’s novels with the goal of being ready to start writing upon my return to campus. My aspirations were rather ambitious, as I had only
made it through two of Austen’s novels by the time I moved into my room and the hysteria of senior year began. However, after my first meeting with Professor Susan Wolfson, my calm, unshakable thesis adviser, I shifted into gear and voraciously consumed the last four of Austen’s novels. This sudden burst in reading was fueled by Professor Wolfson’s suggestion that I begin writing immediately, as the sooner I started writing, the more material I would have to use, the more space I would have to work out my thoughts, and the less anxiety I would ultimately have about the actual writing. As she said, “The thesis gets written five or seven pages at a time, not all 80 in one go the week before it is due.” She charged me with writing out my thoughts on each novel, picking out passages that I thought were relevant, and writing brief analyses of characters that I deemed interesting. Throughout my reading, I noticed that each of Austen’s heroines had a father to whom she was inherently linked, whether he was dead or alive. I felt that in all of my discussions on Austen’s novels, this topic had never been addressed, save a cursory note that Emma’s father, Mr. Woodhouse, was a selfish hypochondriac, or that Elizabeth Bennet’s father, Mr. Bennet, was a recluse who preferred his books to his family. This was the perfect way for me to delve into Austen without feeling as though I had nothing original to offer, that it had all been said before. Thus, my thesis was born.

However, I needed something else to truly get into Austen and her writing. My semester at University College London highlighted the stimulating nature of researching and reading in the very location in which the text was written and ultimately set, and so I returned to London during fall break in order to experience Austen in her natural setting. I wanted to make her come to life, to make her feel like a close friend instead of a removed figure from the early 19th century. I spent much of my week in one of the reading rooms at the British Library going through Austen’s original letters, excerpts of her manuscripts, and reviews of friends and family that she had collected regarding her work on *Emma* and *Mansfield Park*. In addition, I traveled to Austen’s family home in Chawton just over an hour outside of London. When I arrived at the train station and told the taxi driver that I was going to Jane Austen’s house, I was told that “Jane is not in” but that I could go to the house regardless. This was just what I had hoped for; Austen became Jane. Seeing the tiny desk, no greater than 12 inches across, where she sat and wrote her novels, coupled with the all too ordinary letters she wrote to friends and family, brought this simple, observant, insightful young woman to life. Jane, much as her heroines, was simply searching for happiness in life, love, and family.

I returned to campus with new vigor and an increasing focus on what I wanted my thesis to be. Exploring all six novels would require a 200-page thesis instead of an 80 to 100 page one; as a result, I decided to focus on three novels spanning Austen’s brief career. *Pride and Prejudice*, *Emma*, and
I have never been so invested emotionally and intellectually in a single undertaking. *Persuasion* serve as examples of Austen’s early, middle, and late works, tracing the development of her thinking. We begin with the ultimate marriage plot novel, and then move to a novel that ends with an unusual marriage, and finally we conclude with a novel in which marriage is delayed almost to the point of impossibility. This was going to be an exploration of how Emma Woodhouse, Lizzie Bennet, and Anne Elliot transformed into exceptional, remarkable young women despite the confines of their mundane, stifling homes, and the more restrictive confines of a patriarchal society.

I could never have achieved such focus without the guidance of Professor Wolfson. We would meet for an hour at least twice a month during the first semester and then once a week, if not more, by the last four months of the thesis process. Professor Wolfson was always insistent that we maintain a conversation in writing, where I would e-mail her my work for the week, be it a draft of a whole chapter, questions about my research, difficulties I had with my writing, or characters I found interesting and wanted to focus on. We would spend our meetings discussing my writing and any general concerns, frustrations, or anxieties I was having. Professor Wolfson kept me on course regardless of how far off I was trying to go, she always encouraged me despite my being exhausted or overwhelmed, and she never ceased to provide an interesting angle encouraging me to think about Austen in new and compelling ways.

Part of my struggle in writing my thesis was the lack of critical research on my specific topic. One would assume that a plethora of criticism would exist on the topic of fathers and daughters in Austen’s novels; however, I was surprised to find that only a passing remark was made about the most obvious aspects of patriarchy and its effects on daughters. Instead of allowing me to feel paralyzed by the lack of research available, Professor Wolfson helped me run with the originality of my topic by guiding me toward Austen’s predecessors as a means of offering my own analysis of Austen’s interpretation and subtle rejection of patriarchy. I entered the world of the conduct manuals by Drs. John Gregory and James Fordyce, written in 1774 and 1765, respectively. These fathers address the appropriate behavior of their daughters in terms of religion, piety, meekness, reserve, virtue, amusement, conversation, friendship, love, and marriage. The ultimate goal of this advisory literature is to produce the perfect marriageable woman. To mold and fine-tune her behavior as the ideal daughter is to prepare her to be the perfect, obedient wife. Austen rejects this premise by creating neglectful fathers whose daughters are far from obedient and who are more unconcerned with marriage than they should be given their circumstances. Without Professor Wolfson, I would never have achieved such a nuanced angle on Austen’s fathers and daughters.

There is nothing like writing the thesis. I have never been so invested emotionally and intellectually in a single undertaking. I never worried so
much, I never spent so much time in Firestone, I never became so excited over
the most simple of revelations, and I never thought that it would actually be over.
While a taxing, exhausting, overwhelming, and grueling process, the thesis of-
fered a great challenge and an even more gratifying triumph. I now have a bound
black book filled with 120 pages of my blood, sweat, and tears, a book that I am
proud to have my name on.

If you had asked me a year ago if I would have felt this way about my thesis,
I would have laughed, much as you may be laughing now. I proved myself and
my cynicism wrong. The year that I spent writing the thesis will always be a part
of me and my Princeton experience, much as it will become part of yours.

Susan J. Wolfson
Professor of English

Shelly Kellner’s award-winning thesis was not mapped out when Shelly and I
began talking the summer before her senior year. Shelly had taken an inspiring
course on Austen from my colleague Claudia Johnson, and had thought of writ-
ing about cinematic interpretations of Austen’s verbal universe. With Professor
Johnson on sabbatical during Shelly’s senior year, I became her mentor and
watched her thinking evolve as she read more widely in the primary and second-
ary literature.

One of the most enjoyable aspects of the thesis process, for me and my stu-
dents, has been the unfolding dynamic, across six months or more, of discussion
(e-mail exchanges and personal meetings), writing and research, evaluation and
rewriting. Shelly took to the process as a valuable Princeton gift to its majors, and
over its course emerged as a genuine author. Like many of our best students, in
regular coursework, Shelly sometimes found herself wishing that, having written
a tentative essay, she could, with the benefit of a professor’s comments, revise
her work to better satisfaction. The thesis year was an ideal laboratory for this
impulse.

Shelly typically began with alert questions about events, passages, episodes,
or narrative developments that intrigued and perplexed her. Putting these
reactions on the page, she used her weekly conversations with me to the test
of development. Shelly would then return to her reading and writing, with my
encouragement, to formulate new, or more refined questions, rather than feel the
pressure to come up with clear answers. As Shelly’s critical interests sharpened,
I’d suggest critical literature that would challenge and inspire her.

One thing that the thesis experience involves is an encounter with criticism,
not as a resource of “right answers” but as a conversation one can join, even in
disagreement or dissatisfaction. This is a literature, too, Shelly discovered—one
that requires not just a narrative (the critical argument) but also the critical arti-
fact. As a story with a point of view, exemplary episodes, conclusions useful or
debatable, the artistry of the critical essay is in many ways analogous to the art-
One thing that the thesis experience involves is an encounter with criticism, not as a resource of “right answers” but as a conversation one can join...

As Shelly’s involvement with Austen’s artistry increased in depth and dimension, she felt a growing confidence in her own critical voice. What was gathering to her attention was something which the critical literature (in its fascination with the Austenian heroine) had managed to under-report. This was the formative influence of fathers and father-figures on a heroine’s independence of judgment.

If Austen’s novels are famously devoted to the heroine’s discovery of the man she wants to (and will) marry, Shelly found the “marriage plots” curiously shaded by weak, even dysfunctional fathers. “Absence Breeding Autonomy” became her contribution to Austen studies. The title could well describe Shelly’s own progress: an “independent project” bred by an absence in the critical literature. What Shelly wanted to indicate was the situation, a paradox of pain and potential, that opens up when biological fathers default in responsibility (social and emotional) to their daughters’ development as capable adults. With precision and interpretive sympathy, Shelly tracked the labors assigned to or undertaken by daughters to replace their absent and errant fathers with new and improved ones, even to manage a life without them.

Once Shelly focused on this interest (it took a few months of trial and error), everything began to click for her. Claudia Johnson’s syllabus shifted into a new perspective, and Shelly developed it with further reading in the “conduct manuals”: those patriarchal advice books on the proper way to raise a proper, marriageable daughter. During the fall, she was taking Deborah Nord’s course, “Beyond the Marriage Plot,” which set this prestigious genre in relation to other developments in women’s fiction. Shelly’s first venture in writing about fathers and daughters was in fact a short paper for this course. Though it proposed more than it could accomplish there, it now proved fertile for her thesis. In the spring, when she was taking Jeff Nunokawa’s course on Victorian fiction, she recognized the vectors of her interests after Austen, particularly in Vanity Fair. Though her thesis was on Austen, it was becoming a lively synthesis of her larger adventures as an English major.

Shelly wanted to investigate an important prequel to the marriage plot, with fathers leaving, one way or another, the daughters they are charged with overseeing and giving away in marriage. With a patient acuity (a quality of attention continuous with the intelligence of Austen’s heroines), Shelly developed an original perspective on three novels where her paradigm is most clearly at hand and at work.

Her chapter on Austen’s most famous novel, Pride and Prejudice, had a memorably sly title, “The Real Mr. Bennet.” Sly, because this is not to be Elizabeth Bennet’s biological father, a father amusingly but culpably in default of paternal responsibilities. The real Mr. Bennet (the parent who cares for the future of the five Bennet daughters) turns out to be Mrs. Bennet. Reversing
the view, both inside the novel and on a shelf of critical literature, of Mrs. Bennet
as a laughable hysteric, Shelly teased out “the true patriarch of the Bennet family”:
one whose exquisite alertness to the impending disaster of entail (exclusively
male inheritance) makes her exquisitely devoted to establishing her daughters
in marriage. Facing the critical consensus on her foolishness, it took Shelly a while
to have the confidence of her proposal; once she discerned the ethical stakes,
she argued a thoroughly convincing case—all the more compelling for doing
justice to a character that even Austen, one of the sharpest judges of character,
fails to do herself.

Having worked out a quirky paradigm against the grain for *Pride and Prejudice*,
Shelly was ready to wrestle with two more difficult novels, one with a less likeable
heroine, *Emma*, and a last dark novel, *Persuasion*. Primed by her engagement with
*Pride and Prejudice*, Shelly’s work on these novels took shape more quickly in basic
outline, even as she undertook revision after revision to clarify and refine her ar-
ticulation. “Emma’s Two Fathers” homed in on the distinction between biological
and virtual patriarchs—a vexation not confined to the protagonist. The subsidiary
and collateral stories sharpened Shelly’s measure of Emma, a heroine whose
biological father is so defective as to transform her into his virtual father, and to
seek in a husband a virtual father who will monitor and mentor her. The next
chapter, on *Persuasion*, addressed the starkest instance of a defective—indeed,
repulsive—father (“Mr. Elliot of Kellynch-Hall”), a defect which Shelly persuades us
is among the deepest sources of pathos in a dark, brave novel, scarcely lightened
by its conclusion in marriage.

The admirable penetration of “Absence Breeding Autonomy: Incompetent
Fathers and Their Unconventional Daughters” had me a little apprehensive about
meeting Shelly’s own father on Class Day, wondering if there was an impetus
to her attention in lived experience. When I met Mr. Kellner, I was touched to
discover a warm, supportive parent, beaming proudly, and moved even to tears
by the accomplishments of his extraordinary daughter.
I remember the first time I entered Jerome Silbergeld’s wonderfully professorial office, wheezing after taking that last flight of stairs leading to his perch atop the McCormick art museum. Looking back on that occasion, I would have to say that I didn’t so much decide on a thesis topic as I did wander into one, happily oblivious to the amount of work that would be involved in writing about film, but fortunate to have chosen the right staircase to climb. When I said what I wanted to write about—and I believe my words went something along the lines of saying, “the social, political, historical, and cultural issues of queer identity in the East Asian Chinese diaspora…as represented through film”—Professor Silbergeld smiled kindly.

“All right,” he said, “but we might want to narrow that down just a little.”

Indeed. And that exchange, I must admit embarrassingly, was for my spring junior paper.

In all seriousness though, and at the risk of sounding just like all the rest of the well-intentioned but hopelessly vague advice that gets force-fed to Princeton students, I can’t help but implore you to choose a topic that you love, by which I mean something that you are going to be content spending a good deal of time alone with, something that will interest you to the point that you do the project justice, rather than rushing through things at the end. My own process started with one simple, but heartily sincere thought, which was that I liked Chinese movies and was intrigued by the cultural differences in gay life I had observed in Beijing while at Princeton’s summer language program there. True, it initially resulted in a vaguely defined, over-ambitious start, but it kept me motivated through that brutal January to April home stretch, and has left me genuinely proud of what I produced.

The second thing I can say with complete certainty is that choosing your adviser is as important as choosing your topic itself. With my first semester departmental seminar over, having authored a fall junior paper on the Boxer Rebellion—a topic I was decidedly lukewarm about—I decided to cast my net out to a range of potential advisers with the litany of pie-in-the-sky ideas I had for spring JPs. After perusing my department’s listings, I e-mailed those ideas to the relevant professors. Truth be told, one of the main reasons I initially made the hike up to Professor Silbergeld’s office was that his reply to me concerning my desire to write about film was both timely and enthusiastic. That responsiveness, and the supportive patience and direction he provided in all my meetings with him, made Professor Silbergeld a wonderful adviser to work under. I would encourage you to seek out someone who will treat you similarly.

Thus, despite having no experience in film criticism—not even having taken Professor Silbergeld’s course on Chinese cinema—I signed on to write my JP with him. With his assistance, I was able to compile a viewing list of Chinese films portraying queer individuals, which I then sat down over the
next couple of weeks to view while I plodded through the materials available on queer Chinese cinema (not much) and specific directors relevant to that topic (next to nothing). Finally, after being forced at each step along the way to narrow my scope, I ended up with a paper on *The Hole* by Tsai Ming-liang.

In brainstorming thesis topics as my last summer holiday drew to a close, it became clear to me that, as happy as I was with what I had produced in the spring, I was reluctant to revisit a subject that I had touched upon. While I can say now that there was still a great deal more to say about Tsai's work, at the time it simply felt as if I was taking an easy way out. Which brings me to my third point: Don't be afraid to revisit a subject you feel you have exhausted, because after ultimately choosing to revisit Tsai's films, I know some of the best aspects of my thesis grew dramatically from the seeds planted in that first semester of writing during my junior year. Indeed, not only was it much easier to get started with some prior knowledge of my chosen subject matter, but as the number of days to deadline season steadily shrunk, I grew increasingly grateful for the level of familiarity with which I had started.

By the time December rolled around, I had spoken multiple times with Professor Silbergeld, read as much as I could, and watched each of Tsai's films, eight in total (now nine), several times. After all that, however, as Professor Silbergeld gently pointed out when the first drafting deadlines began to roll around, I had absolutely nothing to show for it. Flustered and overwhelmed by the breadth of what I had read and seen, I took a complete hiatus from thesis work. During that time, I came to realize that for all my enthusiasm and experience with Tsai's work, I had approached forming an argument about his work lacking one crucial thing: a plan. So, when I returned from break, I read and wrote nothing until I had a schedule for the next four months down on paper.

Which brings me to my final, and really my most important point: Do what works for you. In all honestly, I haven’t a clue what my "plan" consisted of, only that taking a step back was undeniably necessary for me at that point in time. You’ll have friends who complete their theses weeks early (though they quickly learn to keep quiet about it), and others who have sleep-deprived heart palpitations after sprinting to get five-minute Pequod binding. People will name their theses, give you hourly page counts, and even—normally around mid-February—begin to replace random nouns with names pertinent to their topics. I've even heard of one senior who charged 25 cents every time someone dropped the “T-bomb” in her room. But, as large a task as writing a thesis may seem, in the end, like everything else, it's going to get done. Select your topic, adviser, and caffeinated beverage of choice wisely, and it will categorically be the most rewarding process of your Princeton experience.
process of your Princeton experience. Fail to do so, and it will just be another paper you wrote in college. And that, my esteemed fellow Princetonians, would be real shame.

Jerome Silbergeld
P. Y. and Kinmay W. Tang Professor in Chinese Art
Professor of Art and Archaeology

Princeton is genuinely devoted to undergraduate education, and what I like most about our undergraduate curriculum is the requirement for everyone to write a senior thesis. This gives every student the chance to work on an extended project with close faculty consultation, as graduate students do, stimulated by ongoing faculty input but reliant on their own creativity. Many seniors vastly out-perform their own expectations, and Robert Kennelley was one of these in winning the East Asian studies department’s highest thesis prize last year.

Interested in Chinese cinema from an undergraduate seminar he took with me, Robert wrote on the most popular Taiwanese filmmaker in recent years, Tsai Ming-liang, whose films one wouldn’t expect to be popular at all. In my formal report on Robert’s thesis, I described Tsai’s films as “opaque, inchoate, painful, graphic, virtually immobile, and interminable,” to which I added, “This thesis shares some of these characteristics.” Doesn’t sound promising? Tsai’s films quietly circle Taiwan’s gay (tongzhi) subculture, this tongzhi culture and Tsai’s films alike being enthusiastically embraced by an island society that has itself been peripheralized and read out of the family of nations in recent decades.

Tongzhi culture and Taiwan’s empathy for it are socially and psychologically difficult for outsiders to see and grasp, and Robert’s account was conceptually dense and complicated, an ongoing struggle to put into words. In a year of working closely with him through many meetings and numerous drafts, there were only two things I urged on him. One of these, after he completed his first full draft, was to resist the impulse to simplify and streamline it for the sake of his readers. His own convoluted thoughts and style, I insisted, accurately mirrored and conveyed the structure and aesthetic qualities of his subject, and this would be appreciated by anyone who really took his project seriously. But now, late in the game, I urged him to pay attention to one singular, troubling detail, namely that the “gay” hero of Tsai’s films (or anti-hero) is bisexual actually, more complex (“weirder”) than just gay. This focus led Robert to observe how unpredictable Tsai’s tongzhi sexuality really is, repressed, and hidden behind a veil of the main character’s sad but semi-comic quirkiness, as if one were looking at a gay Charlie Chaplin directing his gaze toward a world that he renders as weird and as quirky as himself, “queering” us all, whatever our orientation, and equalizing us all in the process.
It’s almost a cliché to describe writing a thesis as embarking on a journey. It’s a metaphor used by Princeton University graduates time and again when asked to look back on what we’ve accomplished. Our mindset at the end of the process is often so different from when we began that we can’t help feeling as though we’ve completed a sort of four-year-long rite of academic passage. At the beginning of the journey we’re plagued with insecurity. Most of us go through a phase when we don’t think it’s possible to write a thesis. For some it’s as an incoming freshman unused to writing anything longer than 10 pages; for others it’s as a junior, exhausted from having written a junior paper and unsure of where the energy to write an additional 50 pages will come from. For seniors, it occurs at almost every stage: choosing a topic, learning how to work with your adviser, making sense of your data, looking for the one book you need to reference that’s already been checked out, and in the end, as you’re running across the quad trying not to drip sweat on your freshly printed and bound thesis to hand it in to your department before the 4:30 p.m. deadline. After that final draft leaves our hands, however, doubts begin to fade. By the time we reach graduation, we’re confidently reassuring our friends and family that “yea, it’s long, but it’s not that bad.” Having successfully pushed past doubt, data inconsistency, and writer’s block to complete an independent research project we once regarded as impossible, how could we not describe the experience as a journey?

I hit many roadblocks throughout the course of writing my thesis. The major ones were finding a topic, adjusting to my adviser, and focusing my research. The first challenge, of course, was selecting a topic. I ultimately chose to write about race relations surrounding Hurricane Katrina, an extremely current event at the time. The events taking place in New Orleans in the aftermath of Katrina were the first I felt passionately about studying. All summer, heeding the warnings of upperclassmen to start early, I tried to pick a topic in order to get a head start on the research process. I considered writing about Creole languages among Caribbean Americans, or studying Black English Vernacular so that I could write one thesis that would satisfy my linguistics, African American studies, and sociology requirements all at once. I also thought about continuing research on my junior paper, which was about the West Indian Day Parade and panethnic identity formation. In the end, none of these topics interested me enough to make me believe that I could spend a whole school year and 75 to 100 pages discussing them. I was quite discouraged when the end of August arrived and I had nothing to show for my summer of research.

Then on August 29, 2006, New Orleans was hit by a Category 4 hurricane, and I had my thesis topic. The infamous Hurricane Katrina crippled New Orleans. The physical devastation wreaked havoc on the city’s infrastructure. What struck me the most, however, were the social inequalities
that flooded the television screen. I found myself getting angry watching the news and seeing hundreds of thousands of black faces on the screen pleading for help, day after day, with no answer to their calls. Why were there only black faces on the screen, and where was the government aid? Why was there such delay in saving these lives? A good friend of mine, after receiving several phone calls from me ranting about what was happening and stressing over my lack of a thesis topic, suggested the obvious: write about Hurricane Katrina.

Choosing a topic overcame one hurdle. Next came the task of finding an adviser. From my preliminary research, I knew that certain neighborhoods and therefore specific populations in New Orleans were more at risk than others. Residential segregation therefore became the constant I needed as a starting point from which to conduct my research. Knowing that Professor Douglas Massey is the expert on residential segregation, I selected him as my first choice for an adviser.

Although Professor Massey concentrates mostly on quantitative work, he was able to help me with my interviews and was available to meet whenever I asked. If I had to do it over, however, I would have asked him to be stricter in terms of setting periodic deadlines for written sections of my thesis, having regular meetings, and providing a more thorough critique of my work at each stage. Some advisers are extremely involved in every step of their advisees’ work, from defining research questions to outlining thesis chapters. Professor Massey took a more hands-off approach, preferring to discuss my thoughts and gently point me in the right direction to discover the answers on my own. When I came to him in September with a rough outline of what I wanted to do, I expected him to jump in and firm up my research question for me. Instead, he just encouraged me to go out into the field and see what I found and let my research direct me. Part of this was because my topic was so current that he didn’t always know where to look or what I would find. The rest, I believe, is because he wanted me to have a genuine, original research experience. I remember leaving his office frustrated and excited all at once. Frustrated because I thought he must have had ideas of where my work should go and what mistakes I would make before I made them, but excited because he trusted me enough to grant me the freedom to work through the process for myself.

I honestly LOVED every minute of my research. From finding old hand-drawn maps of the city in the historic archives of the French Quarter, to interviewing survivors I met while walking down the street, to searching for books in the depths of Firestone Library for the best theories to explain my findings, I enjoyed my work. Because I didn’t know exactly what I was looking for, I had to pursue any and all connections I could. I spent time with
New York University film students who were interviewing Katrina evacuees in a hotel in Queens; I met with a biology professor at Tulane; I even interviewed the wife of a late New Orleans local jazz legend. In the midst of extreme devastation, I managed to find amazingly generous and kind individuals. Most people I encountered seemed open to talking with me and willing to help me with my research. It really meant a lot that so many trusted me with their stories, and I became that much more invested in my work. It was important to me that I represent these survivors accurately and let their voices be heard.

What I learned from interviewing people from different backgrounds and perspectives challenged the hypotheses I had generated before going into the field, based on what I had learned from the archives. In studying New Orleans's history and current racial distribution, it was evident to me that some racial discrimination, whether direct or indirect, had occurred. I expected people to recognize residential segregation within the city and believe that the government had discriminated against blacks in their response to the disaster. What I found, however, was a refusal on behalf of the survivors to blame race and an opportunity to study different manifestations of racism and discrimination.

Although my research was enjoyable, it was not free of difficulties. I was collecting extensive background information about racial distribution in New Orleans and survivors' perception of racial discrimination in the city, especially in the wake of Hurricane Katrina. I did not, however, have a definitive research question. In reality, there is often a lot of back and forth between conducting research and defining your question as each informs the other. With the limited amount of time allotted for a senior thesis, however, it is easy to get into trouble by leaving your question too open. I unfortunately fell into this trap. I had so much information that I didn't know how to focus my question. I was reading theory up until the last minute, trying to pull together all of the interesting and significant details I had uncovered.

Ironically, in the last days of research, I found myself back at the beginning. One of the first people I consulted about my project recommended I read a book called *Heat Wave: A Social Autopsy of Disaster in Chicago* by Eric Klinenberg. I immediately read the book, but I didn't like the approach and failed to see how it related to what I wanted to do at the time. Six months and several research questions later I found myself right back with Klinenberg, using his framework as a foundation for my work. Rereading is crucial! Something that may not have been applicable when you started can become a critical resource as you come to better understand your work and how it fits within the larger body of literature. The more I engaged my own data and discussed my work with some very insightful graduate students, the more I understood how what I was researching complemented as well as critiqued Klinenberg's study. Revisiting Klinenberg's work helped pull my
thesis together. It took just a few well-placed paragraphs and references to Klinenberg’s successes and failures to give my research sociological significance.

Writing a thesis may be one of the most difficult things you’ll do in your time at Princeton. I spent many nights feeling as though my research wouldn’t come together and wishing my adviser would just tell me what to write. I’ve since learned that independent research is an organic process that involves much reading and rereading, writing and rewriting, questioning and re-questioning, as you come to better understand your data and the theories that you’re engaging. There is no shortcut to the finish line, and no matter how early you choose your topic and how sure you are about what you want to study, it is impossible to know exactly how the final product will turn out until you actually arrive at the conclusion. Writing a thesis is a journey. However trite, it’s the best way I’ve found to describe the experience. Writing my thesis was definitely an academic experience that left me in a different place from where I had started and a different place from where I imagined I would end.

Douglas S. Massey
Henry G. Bryant Professor of Sociology and Public Affairs

Like most Americans in the summer of 2005, Cherice Landers was dismayed by the images coming out of New Orleans in the aftermath of Hurricane Katrina. As an African American, she was particularly aware of the fact that most of the faces of suffering, loss, and despair were black. Intuitively she grasped that the catastrophe was as much social as natural in origin. Although she could not yet articulate it, she instinctively knew that the hurricane’s racially disparate effects were somehow linked to racialized political decisions that had put poor African Americans disproportionately in harm’s way.

As soon as the semester began, she came to see me—I think because the events of Katrina resonated with many of the points I had made the year before in my course on “Race and Public Policy,” which I offer each year through the Woodrow Wilson School. A principal lesson of that course is that many of the racially disparate outcomes we observe in the United States, both historically and today, follow from structural arrangements that are built into the fabric of U.S. society, usually as a result of prejudicial policies and practices. As the author of a book entitled American Apartheid, I have paid particular attention in my career to the role of residential segregation in conditioning the life chances experienced by African Americans.

My job as a professor was to channel Cherice’s feelings of anger and outrage into insight and understanding about the social origins of the tragedy. It was what educators call “a teachable moment.” To get her started, I guided her toward three literatures that I thought would help her make sociological sense of what had happened. The first literature was the sociology of disaster itself, embodied
most recently in Eric Klinenberg’s analysis of deaths during the 1995 Chicago heat wave. This and other works provided a springboard into the field of human ecology theories associated with classic theorists of the Chicago School such as Robert Park, Louis Wirth, and Ernest Burgess. Finally, there was the historical literature on settlement and segregation in New Orleans, notably John Blassingame’s study of the evolution of black New Orleans in the late 19th century.

These readings gave Cherice a conceptual framework and a factual basis with which to interpret the Katrina disaster. Although she viewed the ecological model approvingly, she drew on a recent critique of Klinenberg’s study by Princeton’s own Professor Mitchell Duneier to argue for the importance of combining cartographic and ethnographic data with the ecological framework to yield a full and complete understanding of what happened. She then proposed a methodology for studying the social origins of the Katrina disaster that blended in-depth interviews with the production of maps using the techniques offered by Geographic Information Systems software. She developed an interview schedule, submitted it and her sampling plan to the Princeton human subjects committee for review, and after receiving a green light went out and conducted personal interviews with 19 Katrina survivors that she located during fieldwork in New Orleans and in refugee centers.

Her thesis cogently wove together media accounts of the disaster with the words of her respondents to describe the event and how it was perceived by local residents. A series of illustrative photographs, some taken by her, made the storm and its consequences come vividly alive. After introducing the topic in these vivid, personal terms, she drew on the historical literature to review the construction of the City of New Orleans and the racialization of its geography through racial and class segregation interacting with local topography. Her history of the city began with its founding by French traders and ended with a detailed analysis of 2000 census data, which she plotted geographically by neighborhood and combined with her own qualitative analysis of the city’s racialized geography that made excellent use of her own ethnographic data.

In the final section of the thesis, she showed how racial segregation, class segregation, and local topography interacted to produce a disaster whose costs and negative consequences were unevenly borne by black and white, rich and poor residents of the city. The interesting concluding twist is the resistance of most residents—black and white—to seeing the effects of Hurricane Katrina in racial terms. She interpreted this active denial as evidence of the degree to which the city’s racial geography has been internalized. Although everyone “knows” that New Orleans had separate black and white neighborhoods, and that most white areas were rich and on high ground while most black areas were poor and low-lying, this perception
was so ingrained in people’s mental maps that it was perceived as completely “natural” and unremarkable.

As soon as I read the thesis, I knew it was something special, clearly illuminating the social roots of what was widely perceived as a “natural disaster.” It accomplished this feat by developing a sound framework for interpretation grounded in the sociological and historical literatures and then testing it through an original analysis of cartographical and ethnographical data. As a sterling example of what is best about the senior thesis at Princeton, I brought it to the attention of my colleagues and was pleased to see they concurred in this judgment by awarding Cherice the department’s Lisa N. Bryant Award, which annually honors the graduating senior who best exemplifies commitment to the welfare of others through the application of sociological knowledge to the analysis of social needs.
A controversial topic always makes research more interesting, especially when the issue bears some personal relevance. When selecting an adviser for my thesis in the spring of my junior year, I already knew that I wanted to dive into the emotionally charged debate of race relations, namely the less explored region of interracial dating. As a product of an interracial marriage, I find the opinions my friends and others around me espouse regarding interracial relationships fascinating. I contacted potential advisers early on to ensure that I would have the opportunity to work with one of my top choices. Fortunately, Professor Susan Fiske not only had an available spot, but also was genuinely interested in my choice of research, enabling me to relax over the summer, knowing that half the thesis battle was over.

Although I never set out with the intention to label anyone a racist, I did want to prove that despite an increase in multiculturalism and diversity, interracial dating is still not as widely tolerated as we might expect. Like most seniors, I only began narrowing a specific research question in the fall. The bulk of data on interracial relationships gravitate toward ethnographic and sociological research. My major concern was to make my experiment psychological rather than sociological. With guidance from my adviser, I focused my study on how heterosexual students' perceptions of other ethnic groups and gender roles shaped their interracial dating experiences.

One of the more exciting aspects to the psychology thesis was the chance to conduct my very own experiment. It provided me with the opportunity to test out my own ideas about gathering information as well as exposing me to the intricacies of even the simplest experiments. The trick was to figure out how to get busy students to answer a survey long enough to cover all the necessary aspects without losing their attention. Multiple drafts and a few test-drives later, my thesis turned into a waiting game. Whereas most seniors were frantically turning in first chapters to meet deadlines before winter vacation, I anxiously awaited responses to my e-mail pleading with my fellow students to take my Web survey. To my surprise, around 300 students filled out my survey, but a minor setback with the Internet invalidated around half of those responses. Though disappointing, I still managed to exceed my minimum goal of 100 full responses.

While collecting the data was almost effortless, analyzing it proved more daunting. Naturally, a complicated survey translates into a very complex data set, resulting in many long hours spent at the computer clusters. Professor Fiske played a critical role during this stage since I would have not known how or where to begin analyzing all the data. Her guidance on what tests to run as well as interpreting the results of those tests made the process go much more smoothly. Through analyzing all my findings, I had the rare opportunity to watch my ideas come to life and discover previously unknown trends. Interpreting my data was both the most exciting and the
Aside from finishing my thesis, the most rewarding moment during the whole process was when I realized that I might make a contribution to the literature. While sociology and psychology are saturated with research on interracial marriages, data on the more ephemeral relationships of interracial dating are scant. It is one thing to explore a topic you actually care about, but to have the chance to contribute to an area of research makes the experience even more unique. That is perhaps the best part of writing a thesis—the opportunity to make an imprint on academia as a student. Halfway through simultaneously writing my introduction and analyzing my results, I began to feel that my thesis would be more than just another academic paper, and also offer insight into intergroup relationships.

Though it was based on a small sample of the Princeton community, my research highlighted some fascinating trends regarding interracial dating and stereotypes among college undergraduates. Similar to past studies, I found that Princeton students prefer not to date interracially. But what was most fascinating is that the data revealed possible racial and gender-related social tensions with respect to partner preferences. For instance, white male participants who scored high on the sexism scales, thereby subscribing to more traditional views about gender, were less willing to date female students of another race. Additionally, the majority of non-white participants, who were also predominantly female, were less likely to date Asian men, supporting previous theories about stereotypes held against Asian men. The data revealed so many interesting trends between different racial categories that it was impossible to report all of the findings in a coherent and digestible manner.

It was extremely tough to let go, as Professor Fiske would say, of so many of the findings I found interesting. Although challenging, the experience of fine-tuning such a large piece of writing into a single coherent story is one of the most valuable lessons I have taken away from the thesis process. Forcing myself to remain focused throughout the entire thesis while still fully expressing my argument really honed my writing skills. The research and writing skills I acquired over the course of the project are the most lasting effects I take away with me. My thesis is the first piece of work I am genuinely 100 percent proud of, and I would have no qualms about doing it all over again. This experience has solidified my decision to attend graduate school in a couple of years so that I can continue to explore individuals and how they behave.

If I could offer any advice to upcoming seniors about how to tackle such a frightening paper as the thesis, the first would be just to relax—it really is not as bad as it seems. The beauty of the thesis is that you get to choose what you write about. The only constraints that exist are the ones you set...
for yourself. My friends and I would always joke that the thesis process was akin to having a baby. You spend a significant amount of energy and time working on it, so pick an issue that you are passionate about or that means something to you. Since it is your last year in college, you want to spend every moment, whether writing or socializing, doing things that give you a certain degree of satisfaction. The thesis is a great experience. Whether or not the academic community takes your argument seriously is less important than the fact that the thesis teaches you things you could not have acquired in a classroom. The thesis is one of the many things that makes our undergraduate education so special.

Susan T. Fiske  
Professor of Psychology

Senior theses are an unexpected joy teaching at Princeton. For faculty, they provide a chance to work intensively with students on projects they choose and (later) cherish. For students, they provide a chance to work intensively with faculty on projects in their areas of expertise and enthusiasm. It’s a challenging collaboration on both sides. My advisees see me weekly for individual meetings and twice a month for lab meetings, not to mention all the e-mail. Accomplishing an original research study in eight months is tough, but my advisees all master it.

Theses have a certain rhythm I’ve come to appreciate. Usually I get to know a student during a class or independent paper their junior year, sometimes earlier through participation in summer research programs, sometimes later through their frantic last-minute search of the department Web pages. Usually, we have a prior relationship, and we have some shared interests. In my case, this would be prejudice, in all its manifestations. The first month of school, we push to get a specific and feasible topic—no, even a Princeton senior thesis cannot single-handedly solve centuries of intergroup conflict. Then we work to make a reasonable operationalization, by survey, laboratory experiment, or neuro-imaging study. My advisees run their ideas by the other members of the lab. Although daunting, everyone does it, and the atmosphere is supportive, with feedback running from freshman scholars through visiting faculty. Cookies help. Seeing the graduate students go through the same experience helps. And of course our intense preparation helps. Meanwhile, they write their introduction, framing the project.

In late fall, people collect their data in all kinds of ways: at the campus center, after discussion sections, room-to-room in dorms, on the Web, at train stations, and in laundromats. Students quickly learn how to persuade people to help them with their thesis data, and it’s a campus norm to agree. Meanwhile, they write their methods section.

Following some intense coding and data analysis during the dark hours of winter, students discover eventually what their data are trying to tell them. Often it is not what they expected, but they always learn something. They tell the lab
The chance to see students’ own work, bound in black and gold, makes it all worthwhile.

group, who gives them ideas about more things to try. Data analysis is a process, not an outcome. But even this process is brought short by the April due-date. Somehow, they write their results section.

As I’m reading drafts, they are writing the next sections, and eventually it all gets edited, printed, bound, and delivered in time. The chance to see students’ own work, bound in black and gold, makes it all worthwhile. The department gives balloons, T-shirts, and cookies to celebrate.

Some seniors make a thesis especially fun and even manage to create a publishable paper. Tara wanted to study interracial dating—no easy topic. Her project required finding literatures outside the mainstream of experimental social psychology (e.g., marriage and the family). It required contacting virtually every student of color on campus, to see if they would participate. She had to analyze reams of data, assessing every combination of five ethnicities rating five ethnicities as potential and past friends and dates. And then she had to make sense of the complex patterns. Tara was amazing in her ability to not only meet every deadline, but to be early, prepared for what came next, and enthusiastic the whole time.

From all this, she learned that although most students inevitably are most comfortable dating their own ethnic groups, many do date outside their group. What’s more, their ethnic stereotypes drive their preferences among outgroups. And preferences for traditional gender roles exaggerate these tendencies. She learned a lot that year, not the least being why so few people had previously tackled that complex topic. But she did it, and the results may soon be coming to a publication near you.
I had two good reasons not to write a thesis on poker. The first, a clear question of academic legitimacy, was the one that certain classmates couldn’t help but ask whenever I brought up the idea. In a major where my colleagues’ research could end up influencing everything from the investment strategies of multibillion dollar hedge funds to the resource allocations of the United States military, the prospect of outsmarting some Internet card sharks seemed just a bit too trivial. But I could cope with this misperception; in reality, the game of Texas Hold‘em Poker is governed by a complex system of stochastic processes and nondeterministic human behaviors. The problem is complex enough that academic legends like John Nash and Richard Bellman have pondered how one could even approach a solution. In the last 60 years, leaders in the fields of artificial intelligence, operations research, and computer science have broken the problem down into smaller and smaller pieces, each trying to solve an individual component or derivative game that might lead to a better understanding of its parent system. My solution would take the opposite approach and rely on the interconnectedness of these sub-problems. But we’ll return to that later.

The second argument against pursuing this topic was a personal one: I was bored with poker. In the summer after my sophomore year, I spent a few weeks developing a computer program to help me gain the upper hand when playing poker online. The program asked the user some questions about the hand he was playing and then, using some ultimately unimpressive brute-force methods, it returned the player’s percentage chance of winning the hand and a related play recommendation. I ended up selling the program online and eventually striking a deal with an electronics importer to develop a handheld version of the program. The device was in production by the following summer and was sold in The Sharper Image that holiday season. A few Daily Princetonian articles later, I was suddenly "that poker kid." I couldn’t meet a new person without being asked how sales were going. It got old quickly, and I felt ready to move on to the next chapter in my life.

At the end of junior year, the full ORFE ’06 class convened in some dark corner of the E-Quad to hear presentations from our department’s professors. The purpose of this meeting was for us to start thinking about our thesis topics and who would advise them. I honestly don’t remember anything about that meeting except the final moments of Professor Robert Vanderbei’s presentation. “Poker,” he said, “is an interesting problem. I’m not sure exactly what the best approach would be, but I can think of a few ideas. If anyone is interested in exploring them, it would make an interesting thesis.” I’m not sure if it was the legitimacy added by a respected professor or the fact that the entire room turned around and looked at me, but at that moment I knew that I couldn’t let poker go just yet. I had cashed in on the game without ever really respecting the problem or caring that the current
My next step was to throw away every line of code that I had ever written about poker. I needed to give poker the respect it deserved; it was time to seek a real solution.

That very week, I signed on with Professor Vanderbei and my thesis work began. First came some background research. I found a wealth of academic papers where poker was mentioned, but very few where it was the primary focus. The exception was a team from the University of Alberta who had been working on algorithmic poker strategy for nearly a decade. This group published a wealth of papers on the strategies employed by “Poki,” their autonomous poker-playing software. While I was impressed with the progress the Alberta group had made, I immediately identified an opportunity for improvement. Poki, however powerful, could only play poker within the confines of a poker table that was built around him by his creators. In other words, his opponents could only come to him; he could not go out and find them. This created the risk of a selection bias because the only “opponents” that Poki could model would be that of players in a small online casino where no real money could possibly change hands. These players simply didn’t represent the complex and varied skill sets seen in a real-life casino. (I should note that the Alberta team has since made some impressive advances including robust portability features.)

In order to build a program that could truly take on the strongest poker players, my software would have to play in the world’s most popular online casinos, where at any moment millions of dollars are in play on virtual poker tables. These were the world’s real opponents, and a true solution could only be tested by facing off against them. Other necessary features would include full autonomy, undetectability by the host casino, and the ability to automatically adapt play strategy to new information.

My next step was to throw away every line of code that I had ever written about poker. I would put my existing insights to use, but I wanted the implementation to be completely new. Next, I framed the problem mathematically as a non-deterministic sequential decision process. Dynamic programming, the collection of mathematical tools used to analyze such processes, was then employed in formulating the problem and identifying the drivers that would lead the program to a decision at each stage of play.

Then came the code. Major modules defined the rules of the game, seamlessly interacted with third-party playing environments, modeled opponent risk profiles, simulated hand outcomes, and ultimately decided on the appropriate action at each stage of play. In the end, I was sitting on a total code count of over ten thousand lines. More importantly, the program worked. I could push a button, go to bed, and wake up to the results of a night-long playing session. The more data this program collected, the smarter it got and the more it could earn. I felt content that I had done what I set out to do.
Now, on to the obligatory question: “Has this program made me a millionaire by now?” Not exactly. A growing mass of legal and ethical gray areas has stifled any plans for a large-scale deployment. Many find it hard to believe, but this thesis was not about making money. It was about embracing an amazing Princeton tradition that some students actually dread and turning a one-year opportunity into one of the greatest accomplishments of my lifetime. The thesis didn’t just teach me about what I could do in my senior year of college; it opened my eyes to just how much my classmates and I could accomplish on the other side of FitzRandolph Gate.

For some of you, the time to choose your topics is at hand. Find a topic you love and strive to make it yours. You’ll learn as much about yourself as the topic you are exploring. The rest will seem like anything but work.

Robert J. Vanderbei
Professor of Operations Research and Financial Engineering

There is really very little for me to add to what Robert has written above except maybe I should answer one little question: Did I set bait for Robert when I mentioned that a thesis on poker would be interesting? The answer probably is, yes, a little bit. I had heard of his fame in the poker world so I certainly can’t claim ignorance. But, it was also a time when Texas Hold’em Poker was being mentioned everywhere—that is, on TV, in the New York Times and in the Prince (and that’s about everywhere in my worldview). Apparently there were, and are, serious games played out weekly and broadcast live on television. In addition, there had recently popped up very popular online gaming websites where one can play poker, and other games, 24 hours a day every day. I had only heard of these things. I’d never watched poker. I’d never played poker.

But I did know roughly the rules of the game and, in my textbook, I even devote a section of the chapter on “Game Theory” to an analysis of a simplified version of poker. So, from the start, the idea of studying the mathematics (and the computer science) behind the game of poker was a completely legitimate topic to me. And, to echo some things that Robert said, real life is not that different from poker. There is a reason that game theory is an important subfield of economics (and ORFE).

Anyway, given that poker was in the air, it seemed only natural to mention this as a possible thesis topic. I must confess that I was not entirely surprised that Robert took the bait. The result, as you can surely tell by reading his story, is better than either he or I could have imagined.
must confess that I stumbled across my thesis topic in a bit of a panic, a bit late in the game, and with very little knowledge of the field I was about to plunge into for the next eight months of my life. My plan had been to pick an adviser whose research was related to the area of physics that I aspired to work in as a graduate student, quantum computation. To make a long story short, I ended up changing my mind about a month into the process, when my best friend at Princeton—also a physics major—told me how much he liked his thesis adviser and the work he was doing in his lab. I met with Professor Robert Austin, whose work lies at the interface between physics and biology, and, after a brief introduction to what sounded like a crazy and yet incredibly exciting research project, I signed on the dotted line.

Broadly speaking, my thesis dealt with the adaptive dynamics of bacterial metapopulations on a nanofabricated silicon chip. By etching a lattice of coupled micrometer-sized chemostats, or “microchemostats,” on a silicon chip, my group was able to create a temporally and spatially manipulable habitat landscape, and record the behavior of bacterial metapopulations on it. This nanofabricated device allowed us to physically implement a fitness landscape, a well-known theoretical concept in evolutionary biology, and the adaptive dynamics we observed on it provided an illustration of the potential lying at the interface between nanoscale biophysics and evolutionary biology. Indeed, a section of my thesis discussed the future application of this device to such cutting-edge ideas as directed evolution and microorganism-based computations.

To visualize the device I worked with, it is convenient to think of the lattice of microchemostats, which we referred to interchangeably as “habitat patches,” as a row of 100 square wells linked by narrow corridors in which bacterial metapopulations can live. To make them true chemostats, there are also two parallel channels on either side of the lattice through which resources can be pumped in and wastes can be pumped out. These “feeder highways” are connected to each habitat patch via a nanometer-sized slit large enough to allow for resources to flow in, but small enough to prevent bacteria from swimming out. The presence of these “nanoslits” means that it is not only possible to control the quality of the entire system via the feeder highways, but it is also possible to manipulate the quality of the patches at an individual level, making some patches better to live in than others. Because the patches are interconnected, this has the effect of creating a spatially and temporally manipulable environment much like what would occur in nature, all on a silicon chip measuring less than 1 square centimeter.

The bulk of the work I did for my thesis consisted of the interpretation and mathematical modeling of the strange dynamics that our bacterial metapopulations exhibited when we recorded their behavior on one of our chips over a period of several days. I certainly spent a lot of time in the
lab, and I learned a lot about culturing bacteria and visualizing them in an exceedingly tiny and considerably complex setting. However, I spent far more time analyzing the patterns of images that they produced and trying to reproduce these patterns by means of simulation. Consequently, my individual contribution to the project was predominantly done outside the lab.

Trying to analyze and reproduce the results of our experiments was a daunting task, and one of a completely different nature than anything I had ever done before. As a starting point, I took a set of coupled partial differential equations that are considered to be the starting point for mathematical modeling of bacterial pattern formation. With the guidance of one of the postdocs in my group, I expanded these to four equations. I then modified them, discretized them, and integrated them using a numerical integrator, without really knowing if what I was doing was either the right way of going about things, or at all useful in trying to understand the dynamics of a complex organism (relatively speaking) in a one-of-a-kind, unexplored setting.

My model was successful in reproducing the dynamics we observed at small time scales in our experiment. At larger time scales, however, the model broke down because it could not reproduce the erratic intensity patterns that arose due to changes in the genetic profile of the bacteria as they adapted to living in areas of different quality on our chip. While it was encouraging to find out that my model was on the right track at small time scales, the fact that it did not reflect the adaptive mutations of the bacteria at larger time scales made me question its verisimilitude and usefulness. Strangely enough, this uncertainty was at the heart of the most rewarding part of my thesis work: trying to answer a question whose answer you know is not sitting safely within the covers of a textbook.

While problem-solving on my own was the most rewarding part of my thesis experience, the most enjoyable part of the experience was the time I spent getting to know my adviser and the two postdocs in my group. The intellectual exchanges we had both inside and outside the lab enriched my senior year a great deal, and although they were obviously most often about our research, they in fact spanned a broad range of topics, from other interesting new science being done at Princeton and elsewhere, to politics and religion. Moreover, spending time with them gave me a glimpse of what being a researcher is like, and what a life in academia might consist of if I decided to follow that path upon graduating from Princeton.

Perhaps the most difficult part of the process for me was actually sitting down, cobbling together all the bits of work that I had done over the course of several months, and turning them into a continuous and flowing piece of work that someone would want to read. At the same time, writing 85 pages on a topic that a year earlier had been totally unfamiliar to me had a profound and lasting positive effect on my self-confidence as an aspiring
scientist. This self-confidence, and the friendship I developed with my adviser, are probably the two most important things I gained from my thesis experience.

Writing a thesis is unlike any other academic work you do in college, especially in an area like physics, where your coursework consists predominantly of problem sets with exact answers rather than essays. When you write a thesis, the answers are not all there, and you must rely on your problem-solving skills and the guidance of your adviser to find them. Picking the right adviser can therefore play a crucial role in the successful completion of a thesis. In my case, I interacted with my adviser almost daily, and received feedback from him constantly. I would advise anyone embarking on the process of writing a thesis to choose someone they could see themselves getting along with very well as an adviser.

For any seniors with the thesis experience looming, I would suggest two more things. First, pick a topic that leaves you with a bit of room to wiggle so you can tailor it to your interests as they develop and change. Second, tempting as it may be, do not leave the actual writing process until the end. Rewriting and revising not only helps you write a better thesis, but can also help you rethink some of your analysis and results, and you will not have time to do so if you wait until the last possible moment to start writing. Apart from that, I would just advise you to have fun with it—seeing the process of innovation and discovery in action is immensely rewarding, and writing 100 pages is really not as daunting as it sounds. I promise!

Robert H. Austin
Professor of Physics

the kandy-kolored tangerine-flake streamline senior thesis

Tom Wolfe claims he wrote his iconic article which began the “New Journalism” in the following way: he had writer’s block and was super-late as all good creative journalists are, I hear, so he sent his notes on a hot rod customization convention to his editor in the hope the editor would magically turn the notes into something coherent. The editor of Esquire, Byron Dobell, simply removed the “Dear Byron” salutation and published the notes “as is,” to instant fame.

Dear Seniors: what worked for Tom Wolfe and may work in the English department under certain circumstances WILL NOT WORK in the hard sciences! There lies the rub: you have a heavy course load, you are seriously burned out after three years of intense courses and tangerine-flake deadlines on papers, you may actually have a social life (although I personally discourage it because I never had one), and now there is this big thing looming up at you: the fabled Princeton senior thesis. The senior thesis is supposed to be a life-transforming experience and your chance to do research at the bleeding edge of your field. And… it can happen, you can do really great work, you can even publish your senior thesis,
but it won’t happen at the last minute with a week of all-nighters and gallons of Small World sludge. It might happen if you start early, and if you meet with your adviser often. You have to be the one who pushes, for it may well be not your adviser who is bugging you to show up, because that is part of what the senior thesis is all about: learning to think for yourself, setting your own goals, and figuring out how to get there across rough land. You have to assume that Murphy’s Law is not only amusing, but absolutely true, and so you have to plan on disasters that occur in the worst way and at the worst time. The senior thesis can be a miserable experience, if you procrastinate until the last minute, if you wait for your adviser to ask you what happened to you…then it can be no fun at all and a really wasted opportunity. You must carpe diem.

Well, I advised 2+1/2+1/2 seniors last year. As you might expect with a large sample, some were great, some were not. I think what I said above pretty much fits the data in how these papers turned out. Cici Muldoon was my winner. She came into a really strange project (Evolution on a chip! That’s nuts!) with eyes shining. This project was all new for the four people involved in the project, so we were all feeling our way and we were not sure where it would end up. That is, it was real research, not the dreadful stuff you read in textbooks that strips all the uncertainly and thrill and pain out of the journey. Cici was unusual in that she knew she was going to be taking a pretty wild ride and it didn’t bother her to not know where the train was roaring to in the middle of the night over unknown territory. She had a great, risk-taking-is-O.K. attitude and put the time in and the running up and down the campus and the crashing into Wikipedia to figure out, what exactly is this evolution thing all about and what does physics and experiment have to say about it? Cici wrote an exciting thesis, but it took three of us after she left to keep bashing on it and turn that work into a major publication. You mustn’t expect that the thesis will, without major surgery (unless you are Tom Wolfe), turn into something grand, but with a lot of luck, a lot of work, a lot of planning, and a sense of adventure it can happen, baby.
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There is a pervasive idea, a myth, that science happens in a series of dramatic and unexpected leaps. Moments of inspiration strike and, like Edison, the light bulb turns on. I spent most of my time at Princeton learning that the process more closely resembles a construction project: starting with a blueprint and a clear idea of the desired result, each successive piece of information builds on the previous ones. Eventually the numbers fall into place and we nod and say, “Ah yes, just as I expected.” This may be the way things work in the classroom, but my experience doing field research in remotest southeastern Utah taught me differently.

I had the idea that I might want to study Tamarix ramosissima quite early on; I was certainly considering the possibility by the beginning of my junior year. My reasons were simple: I was passionately attached to the American Southwest, and I wanted a thesis topic that would allow me to do fieldwork there. I was interested in plants and the ecological factors controlling their distribution, and less so in animals or behavioral ecology. And I wanted my thesis to have the at least the potential to make a difference; I wanted to address a topic of importance in the region. Given those criteria, Tamarix was the obvious choice.

Tamarix is an invasive tree species from Asia that colonizes streambeds in dry habitats, displacing native vegetation and destroying wildlife habitat. It is so well adapted to the watercourses of the American Southwest that in the past 80 years it has become one of the most common species along the Colorado River, replacing the stands of cottonwoods and willows native to the region. Various explanations for Tamarix’s extravagant success have been proposed, the most prominent being that the species’ extreme salt-tolerance allows it to survive and thrive in the increasingly saline Colorado Basin.

I had spent enough time in the Southwest to hear about the Tamarix problem. I had also noticed that the species’ distribution was very uneven. In the redrock country of southeastern Utah, neighboring and apparently identical canyons could display completely different abundance of Tamarix. I proposed to use the canyons as a “natural experiment,” with the goal of quantifying the relationship between soil salinity and Tamarix abundance. I hoped that if I could understand this relationship, it might lead to improved treatment programs to prevent the further spread of the species.

But things did not work out quite as I’d hoped. I had planned to study the change in vegetation at sites where two streams of differing salinity mixed, assuming that the resulting salt gradient would correspond to a measurable gradient in the vegetation. But I found that I was working on far too small a scale; I needed to examine entire streamcourses to find the kind of gradients I was looking for. I was out there on my own, so I had to trust myself and simply start collecting data as I thought best.

Professor Stephen Pacala was all I could have wanted in an adviser. First and foremost, he was willing to have faith in my ability to work unsuper-
vised and get the job done. I left for Utah in June, driving west with little more than a plan and boxes of empty soil-sample tubes. I knew where I was headed, having identified prospective study sites while still at Princeton, but I wasn’t sure how to reach them, or what I would find when I arrived there. When I didn’t find what I was hoping for, and called him worried and uncertain, Professor Pacala offered helpful thoughts and encouraged the new directions I was taking in my field research.

Back at Princeton the next semester, Professor Pacala understood all my various concerns and problems with the empathy of someone who had been there before many times. Whenever I went to see him, he would immediately intuit whatever roadblock had come up before me, whether technical or conceptual, show me the way around it, and then proceed to bombard me with all the hard questions that I had been trying to ignore. I sometimes left his office feeling discouraged (inadequate is maybe more accurate), but as his many graduate students will agree, Professor Pacala has a way of giving pep talks when they are most needed. Most often, I left our meetings reinvigorated, with renewed zeal for the process, a better understanding of the next step to take, and the confidence to continue.

Although I did not realize it at the time, perhaps the most important thing I learned from the experience of writing a thesis was the value of gestation time. Most of the actual words that eventually made it into the final copy were written in the last couple of weeks before the thesis was due. But I had been mentally stewing over the content for an entire year. The process was mostly unconscious, but the articles I read, my class assignments and lectures, and conversations with professors and fellow students were all affecting my approach to the puzzle posed by Tamarix. This is, of course, the benefit of living and studying in a place like Princeton: you are surrounded by potential inspiration. Sometimes (all too rarely), my thoughts and ideas took concrete form. I would see a glimmer of light at the end of the tunnel and rush off to my basement “office” in the departmental computer cluster to run the appropriate statistics tests. More often the process was informal and unorganized, a gestalt understanding in the process of evolution.

But no matter how hard I tried, I could not make my data show “what I expected.” Increased soil salinity simply did not correlate with increased Tamarix abundance, and no amount of manipulation would change that basic fact. In the end, it was only my stubbornness that prevented me from writing a thesis that simply declared a negative result. I wanted more than that. I wanted real results, discovery. That is how science is supposed to be, after all. And eventually, after months of struggle and thought, and as the due date drew near, I had my light bulb moment. Soil texture (the relative percentages of sand, silt, and clay), not salinity, was the primary determinant of Tamarix abundance. Tamarix’s competitive advantage was its resistance.
to desiccation in the sandy soils that characterize the post-dam Colorado River.

It made sense (and the numbers fit), even if it was not what I expected. I'll never forget that moment, late one night, when all the conversations, all the papers and thoughts and scribbled notes coalesced, and I suddenly saw the answer. Running the appropriate statistics took only moments. Within five minutes I was staring at the graph that I knew was the centerpiece around which I would build the entire thesis.

That sense of surprise and discovery is at the heart of what attracts many of us to science in the first place. But it is so easy to lose sight of that core amidst the trappings of college education, the requirements of method and format, the need to build a solid foundation of basic knowledge. I was lucky enough to uncover it again for myself, first in the redrock desert of Utah, and then again in the basement computer lab at Princeton.

Scientific research is often like a shotgun wedding, a forced compromise between what you would like to do in principle and the practical realities at hand. Nowhere is this more apt than in field biology, where breakthroughs commonly depend on finding field sites in which some natural pattern is particularly evident or, even better, where historical accident has created a natural controlled experiment. Seasoned scientists typically explore new field sites armed with a long list of questions and look for a compromise between what is scientifically valuable and what is possible to accomplish on the ground. To a significant extent, the ability to identify the right match is what distinguishes the best field scientists from the rest. But this ability is learned; one is not born with it.

Alexander Nees was the kind of student who makes teaching at Princeton a pleasure. His curiosity drove him into my lab group well before it was time to start thinking about junior-senior independent work. He attended my weekly research meetings with graduate students and postdocs and came to see me several times to talk about plant ecology. But I really got to know him during my course on coral reef ecology in Panama during the spring semester of his junior year (part of the Department of Ecology and Evolutionary Biology’s semester in Panama). Although I knew that Alex was bright, knowledgeable and curious from my previous conversations with him, I discovered during the course that he is also an uncommonly gifted naturalist. The class spent most of the hour of each day in the water, and Alex usually saw more than anyone else. Like the best field scientists, he took his observations seriously, proposing explanations whenever he took the snorkel out of his mouth and thinking up new observations to test his ideas.
ideas. The only unfortunate legacy from Panama was that the students and I called him Guylex to distinguish him from a female student on the course who was also named Alex. “Guylex” is now stuck in my mind as his default name, even though no one uses it anymore.

For his senior thesis, Alex proposed to investigate the spread of the invasive shrub *Tamarix* along rivers and streams in semi-arid parts of the American West. *Tamarix* is a native of Asia, and it out-competes native cottonwoods and other plants. The literature claimed that it is more salt tolerant than cottonwoods and that its success as an invader is facilitated by the elevated salinity caused by dams. Alex went west with a list of characteristics for field sites that he had developed at Princeton and in Panama. He was going to locate gradients of salinity caused by the mixing of streams as they entered a reservoir, observe the distributions of the plants along these gradients, and transplant tamarisks and cottonwood seedlings along them. This was a great idea. After all, it is literally inevitable that mixing of low-salinity and high-salinity water will create a gradient. But the idea had never been subjected to what people in my laboratory call “reality therapy.” Alex had never actually been to the sites that logic said had to exist.

Like Lewis and Clark, Alex disappeared into the West and I heard nothing from him for a month. Then came the dispirited two-hour phone call with the report that the salinity gradients were too steep and too unstable to be useful, and that the spatial distribution of the plants did not appear to be consistent with the salinity hypothesis in any case. What was he supposed to do?

The answer was obvious but daunting. Walk as many watercourses as possible and observe the distribution of *Tamarix* and cottonwoods and associated characteristics of the substrate, topography, and streams. Develop another hypothesis or two and take the measurements necessary to test them. Return to Princeton, analyze your data, and write it up.

I knew that Alex had the necessary combination of curiosity, observational ability, and mastery of the relevant scientific literature. In addition, he had the stamina of a mountaineer, seasoned on trips from Patagonia to the Pacific Northwest, and the extensive wilderness experience necessary to explore remote regions and still stay out of danger.

And of course, Alex pulled it off. In his own version of the shotgun wedding, he simultaneously found the critical sites and developed his own hypotheses, and then took the necessary measurements. I had the pleasure of meeting with him periodically throughout his senior year as he struggled with his data and ultimately struck gold. In the end he showed that damming was not a significant factor and that *Tamarix* abundance actually decreases with increasing salinity (the opposite of what he expected). Instead, he found that two characteristics of the soil control seedling
desiccation explain where Tamarix and cottonwoods regenerate in nature. These characteristics also explain over 90 percent of the variation in the relative abundance of two species. Alex’s work in identifying the linchpin of Tamarix’s competitive advantage also provides managers with new options to control a shrub that is so invasive that it is now the third most common species along watercourses in the American West.
To say that I was not looking forward to writing my thesis would be more than just an understatement. Suddenly the celebratory dinner my roommate and I enjoyed after handing in our 25-page junior papers seemed quite absurd in the light of the daunting task that lay ahead. I signed up for this upon admission, but nothing but the fleeting passing of time forced me to realize that I would finally attempt to take on THE thesis. In anticipation of something so quintessentially Princeton, I quickly discovered that a quintessential feeling permeated students in the dwindling months of their junior year. A majority of my classmates shared similar fears and concerns. I asked myself all the basic, yet worrisome questions: What will I write about? Who will be my adviser? Perhaps even more disconcerting was whether I would enjoy devoting so much time, effort, and energy to such a project. Visions of the sleepless nights and endless days spent hiding in my C floor carrel haunted me as I walked into the summer of my senior year. With these frightening images, I could not help but wonder, would it all be worth it?

In order to ensure that I would get as much out of my thesis as I put into it, I was determined to choose a topic that I would enjoy spending intimate time getting to know. As a major in the political economy program in the politics department, I had to focus my thesis on a particular economic effect within American politics. With the exception of these basic parameters, I was free to write about anything, a task that initially seemed much more overwhelming than liberating. The summer before my senior year I read *Freakonomics* by economist Steven Levitt and journalist Stephen Dubner, a book that provocatively explores how economic data can explain a variety of socioeconomic questions. While Levitt’s work argues several intriguing points, his link between faulty risk assessment by the public and political strategy attracted most of my attention.

The examples Levitt utilizes in *Freakonomics* piqued my interest, ultimately inspiring my own investigation into how politicians may use faulty risk assessment by the public to their own political advantage. At the same time I had also been fascinated with the media’s persistent focus on stories that appealed to public fears. This intrigue, coupled with my interest in the topics raised by Levitt and Dubner, inspired my own investigation into the way American presidents may use “fear appeals,” or persuasive messages that incite fear, to their advantage. More specifically, I wanted to investigate how presidents may use fear in times of national economic distress. In this regard, I hoped to pursue a path that had not been explored previously, but one that could build upon established political, sociological, psychological, and economic theories.

Now that I established my topic, choosing my adviser was the next logical step. Unfortunately, none of my previous professors provided expertise that would contribute to my particular investigation. As a result, I reached...
out to the politics department, requesting a list of professors and their areas of expertise. From this list, I selected the professors who specialized in American presidents, economics, and mass media communications. I scheduled appointments with several professors and found that Professor Brandice Canes-Wrone embodied the level of expertise and guidance that I was looking for in an adviser. To confirm my decision, Professor Canes-Wrone and I agreed that a tentative timeline incorporating regular deadlines would be an extremely important and beneficial tool to keep me on track throughout the writing process.

With my topic in hand and adviser selected, organization and execution of my research and writing method were the next priorities on my agenda. Simply stated, this was the most difficult part. I knew more research done upfront would streamline the writing process by clarifying and organizing the key topics and details that I would cover. As a result, the first major step was developing a detailed outline that included what topics would be covered in each chapter. In order to do so, I started to ask questions crucial in understanding whether American presidents use fear to their advantage in times of economic crisis. To answer this question, a series of smaller questions had to be pursued. Such questions included: How does the public respond to fear appeals? How have American presidents attempted to divert public attention, specifically in times of economic hardship? In addition to these background questions, I then had to establish a method of measuring how economic factors could influence presidential use of fear.

Throughout the research and writing processes, my adviser proved to be an invaluable resource. In our meetings we discussed the important literatures I should explore as well as the best measurement tools and methodology. Professor Canes-Wrone’s expertise and experience provided direction necessary to keep my thesis on track, focused, and productive. In addition to my adviser’s guidance, the analysts in the Firestone data lab supplied an endless amount of support, wisdom, and resources that contributed to a successful series of data analyses crucial to my work’s investigation. With their help, the help of my adviser, and long days and nights in Firestone, I gradually compiled answers to most of the questions I had set out to explore. Like pieces of a puzzle, these answers combined to illustrate the bigger picture or story that I initially set out to explain in my thesis.

Looking back at my experience, it is difficult to pinpoint specific difficulties and surprises. It has never been a surprise that writing a thesis is difficult. Quite ironically, however, in this lack of surprise comes the biggest surprise of all: the rewarding sense of accomplishment when one completes such a challenging project. I was quite surprised to discover the level of fulfillment attained through the hard work and consistent exploration of my independent work. After more than eight months spent on this particular investigation, I became a subject matter expert well versed in an area I found particularly intriguing. I answered questions that sparked my interest, and in doing so contributed to the field of political economy with valid and measurable results that explain how American presidents may use fear to divert attention from economic hardships.
I was quite surprised to discover the level of fulfillment attained through the hard work and consistent exploration of my independent work.

Brandice Canes-Wrone
Associate Professor of Politics and Public Affairs

I have had the opportunity to view the thesis from a number of vantage points. Quite some years ago now, when I was an undergraduate here, my friends and I were introduced to this Princeton institution. Then as a faculty member at other universities, in which theses were written by only a select few students, I saw that most undergraduates left college without any real understanding of how to put together a basic research enterprise. I saw this as a real disadvantage to those students given that in a variety of careers, people are asked to assemble new information—whether it consists of campaign information for politicians, financial data, or legal histories—and present it in a clearly written product. In most college classes, there simply is not the time for students to do more than summarize or critique existing information. The thesis breaks us out of this mold of teaching and enables students to make their own contribution to knowledge.

Because this skill of developing and presenting new knowledge is so valuable to many career paths, I believe strongly that the thesis is an important part of a Princeton education whatever a student’s ultimate goals may be. Lauren Nestor is a case in point. When Lauren came to me to see if I would be interested in advising her thesis, she made it clear from the outset that she wanted to do a good job on the thesis, but had no real interest in ever becoming a scholar. I told her that was fine, and that wanting to become a scholar in the long term was hardly a requirement for writing an excellent thesis or for feeling that the thesis was a worthwhile experience. Lauren actually had most of the important requirements for good thesis-writing at the outset. She had a good sense of a topic that interested her, which was how presidents’ rhetorical use of fear and threat may be used to divert public attention from domestic issues. She was open to the suggestion that the topic might have to be tightened to a specific question
in order to complete the thesis on time. And she had two qualities that are absolutely necessary for producing an excellent thesis: she understood that writing one would involve a lot of work, no matter how smart one is; and she recognized immediately that this work needed to begin at full-speed in the first semester.

Lauren went on to produce a thesis with results of interest not only to scholars but also political practitioners and even the more general public. Following her interest in the possibility that presidents use fear rhetoric as a means of diverting public attention from domestic problems, Lauren examined whether presidents are more likely to employ the language of fear and threat in major speeches when economic conditions worsen. To provide hard evidence on this question, she employed the literatures on political psychology and the psychology of fear to help her develop an objective schema for assessing the degree to which each sentence of a presidential speech employed fear tactics. She then proceeded to read and code all the major presidential speeches of Franklin D. Roosevelt, Ronald Reagan, and George W. Bush according to this schema. Finally, building off of the literature in political economy, she assessed through statistical analysis how the speechmaking patterns were associated with various economic and political factors.

A major finding of the thesis is that presidents’ speechmaking patterns appear to correlate with unemployment in the way her diversionary hypothesis suggests: namely, presidents are more likely to make use of the rhetoric of fear and threat when the unemployment rate rises. Clearly, this is an interesting finding to those who think and care about what presidents do. However, the thesis is excellent not only for its findings, where Lauren was simply reporting what her data suggest, but due to a number of features. First, by coming up with a reasonable schema for coding the speeches, Lauren was able to produce new data. Thus from the outset, Lauren and I knew that whatever her findings would turn out to be, she would be the first to relay this knowledge. Second, the thesis reflected a deep understanding of the relevant literatures. Third, and not least importantly, the thesis was clearly written so that any faculty member in the politics department—even one without a background in political economy, statistics, or political psychology—could have understood the value of the research.

Advising a thesis writer as motivated and talented as Lauren is a lot of fun. I have to confess, however, that advising less motivated students can still be enjoyable. The reason is that no other pedagogical experience enables faculty to get to know students at the same level. Because the thesis involves meeting with students throughout the year on a one-on-one basis, I end up learning about their interests, experience here at Princeton, and broader ambitions. This interaction not only helps me guide their thesis efforts appropriately, but also makes me more in touch with the current undergraduate body and consequently, enlightens my other pedagogical activities.
For my senior thesis I investigated the alignment between brightest cluster galaxies and the clusters in which they are found. Clusters of galaxies are groups of galaxies that are bound together into a system by their mutual gravity. In fact, clusters of galaxies are the largest such structures in the universe. Each cluster has a brightest member, which may seem a trivial statement at first but it in fact turns out that these galaxies are unusual in other respects as well, and thus form a distinct population from other cluster galaxies. In her Ph.D. thesis in 2001, Rita Kim investigated the phenomenon that BCGs are often aligned (or point in the same direction) as the cluster in which they are found. To understand this one should first note that cluster galaxies are elliptical and hence when seen in two dimensions on the sky appear as oval shapes. Similarly clusters are also elliptical. Hence when we say that the two are aligned we mean that the pointed ends of the oval point in roughly the same direction.

We were able to extend Rita’s research to a much larger sample of clusters using data from the Sloan Digital Sky Survey in which Princeton plays a leading role. The aim of our research was to confirm the previously postulated and observed alignment in a much bigger sample, and to further investigate if clusters at different distances from us and with different properties of BCGs showed different alignments. This investigation was interesting because large-scale structure formation simulations (i.e., computer simulations which attempt to model how the large-scale structure of the universe came about using different theories on how they formed) predict such an alignment. Our further investigation would also allow us to better understand what sort of processes took place in cluster formation and how they influenced the galaxies that took part in it.

I found it very important to start looking for a thesis topic early in the year in order to be able to learn the basics of the topic and then have enough time to do research. Hence I had already begun to think about possible thesis advisers and the general area that I wanted to work in during the summer before my senior year. Upon coming to Princeton in the fall, I began meeting with advisers and discussing possible projects. I talked to three or four people and got papers from them to read on different topics. About three weeks into the semester I had made up my mind based on an intriguing project but also on the fact that I would work with somebody with whom I had not worked before and with whom I believed I could interact for the whole year. In addition, I was hoping that the project would allow me to become familiar with a number of different research techniques and expose me to a new field of astronomy.

My thesis work did not build on previous independent work but some of the basic background ideas had been touched upon in my coursework. This made the background papers I read much more accessible to me. Also, I had worked in the astrophysics department for two summers al-
ready and worked on two junior papers, which gave me a solid foundation in techniques required for data analysis and presentation. In addition, in the summer between junior and senior year I decided not to engage in a research project but rather took up an internship position at a mobile phone service provider. This gave me time to take a break from research and come back to the field of astrophysics with a fresh perspective and renewed enthusiasm.

The first few months of my thesis were mainly spent on background reading and becoming familiar with the tools necessary to extract data from the SDSS. Following winter break we got into the actual data processing and analysis, which required much more work on my part. As I was following up on previous research, the general direction of our investigation was well defined from the start. However, the data processing techniques that we used evolved as more data became available. In addition, we were able to consider new angles of the problem as our research progressed. Finally, we had to do some significant rethinking of certain definitions that we used in defining the shapes of clusters.

Aside from giving myself enough time to do my work, a key factor in the success of the project was the close interaction I had with my adviser. I usually met with my adviser once or twice a week (and accordingly more often as the deadline approached) to discuss questions that I had and to plan what steps I should take next. Aside from providing me with a wealth of background reading (almost all of which I ended up requiring for my research at some stage), he was able to point me in the right direction with theory problems that I encountered and was able to let me know who to ask if there were any software difficulties. He also knew other researchers working in the field, which allowed us to use numerous cluster catalogues and interact with the researchers to better understand how the actual cluster catalogue was put together. In addition, he had done research in the area of clusters and brightest cluster galaxies, which was essential for my work.

My adviser was also very helpful in guiding me in the final write-up of the thesis, and in the transformation of the thesis to a scientific paper that we plan to submit to a refereed journal. In fact, I found that finally putting everything I had done on paper was probably the most challenging part of the thesis. Even though I had planned to summarize certain parts of the project as I did them, this turned out not to be feasible. In addition, after having been immersed in a topic for so long, it was difficult for me to judge what a reader who had not worked in the area would need to know in order to understand the thesis. Accordingly, there was a large amount of rewriting and editing. In addition, during the writing progress certain questions that would be interesting to address using our data cropped up, so I had to interrupt the write-up to perform additional data analysis.
The thesis differed from my previous research projects in that I was able
to follow the development of the question from start to finish and to fulfill
many more of the “in-between steps.” In other projects, significant data
analysis parts would be finished by my adviser and we would not have as
much time to actually work with the data once I had analyzed it.

Michael A. Strauss
Professor of Astrophysical Sciences

A number of years ago, I had an excellent Ph.D. thesis student named Rita
Kim, who carried out a study of clusters of galaxies using the then-nascent
Sloan Digital Sky Survey, a comprehensive map of the heavens in which
Princeton University has played a key role. One of the chapters of her thesis
involved an exploration of the shape of galaxy clusters, and how it relates
to the shape of the individual galaxies that make up the cluster. She was
able to confirm a result hinted at in previous samples; that clusters of galax-
ies tend to be elongated in the same way that the brightest central galaxy
within them is. This tells us important clues about how the clusters, and the
galaxies within them, formed.

Rita finished her thesis in 2001, and after some soul-searching, left ast-
ronomy to get a second Ph.D. in art history (!). In the meantime, the Sloan
Survey has grown rapidly, and we have data on well over 10,000 clusters,
many, many times more than the sample that Rita investigated. It was clear
that it would be fruitful to revisit the trends that she had originally found in
her thesis. As Rita is now much more interested in thinking deep thoughts
about restoration of ancient Greek sculpture than the shapes of galaxy clus-
ters, I was very pleased when Martin Niederste-Ostholt expressed interest in
tackling this problem for his senior thesis.

Martin really ran with this project. It required gaining expertise in a vari-
ety of different areas, including the use of large-scale databases, the cluster
catalogs themselves, and subtle statistical issues associated with the calcu-
lation of shapes of objects. The most dramatic moment of the thesis came
a few days before the due date, when Martin showed the almost-finished
draft to my colleague Jim Gunn. Jim immediately pointed out a flaw in the
analysis, a simple error in the calculation of shapes, which both Martin and
I had overlooked. Martin then put in overtime over the next few days, redid
all his many calculations to fix the problem, and got the thesis, now correct,
turned in on time.

With a sample of over 10,000 clusters, Martin was able to look for trends
in the data at a much more subtle level than was possible before, and to ex-
plore dependence of the alignment of the cluster and its member galaxies
on the size of the cluster, the distance of the cluster from us, and the distri-

… like any good scientific project,
this work raised a whole series of
new questions…

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bution of brightnesses of galaxies in the cluster. As the work progressed, Martin was in my office often, as we would argue about different physical effects, and I would give him long lists of tests to try out, thinking, "That will keep him busy for a while," only to see him having done all the calculations I suggested and more just a few days later. This work is definitely publishable in the refereed scientific literature, and Martin and I are currently discussing how to trim the more than 70-page thesis into something appropriate for *The Astrophysical Journal*.

Indeed, like any good scientific project, this work raised a whole series of new questions: Can we measure the shapes of more distant clusters and see if they have changed systematically with cosmic time? How can we understand the alignment of clusters and the galaxies they make up in terms of models of cluster formation? These questions are fine topics for the next bright senior who wanders into my office looking for something to write a thesis on.
The most daunting part of the senior thesis, at least for me, was coming up with a truly original and engaging topic. A great challenge in working with public source materials or data is that there may be hundreds of graduate students and other scholars who have already reviewed the same sources in search of their own publishable insights, and so the most promising ideas may already have been thoroughly explored by others. Conversely, if one begins by thinking of an interesting topic that no one has previously written on, the lack of previous research may be due to a lack of good data or other sources to support the idea. After several of my early leads ran into one or the other of these roadblocks, I found myself entering fall break without a firm thesis topic in hand. And while I wouldn't advise anyone else to allow so much time to lapse before settling on a topic, I think that taking the time to find a productive topic that I would also find deeply engaging was perhaps the most important step in putting together a successful thesis.

My research interests concern the application of economic analysis to what have traditionally been regarded as non-economic topics. For my first three years at Princeton, I found it difficult to explain to friends and family why I was an economics major when I wasn’t terribly fascinated by the business cycle, international trade, or investment banking. Early in my senior year, however, Steven Levitt’s book *Freakonomics* became a runaway bestseller and introduced the public to how economic techniques can produce new insights into such varied aspects of human behavior as sumo wrestling, good parenting, and online dating, to name a few. Through these techniques, I was able use my economics major to pursue a wide range of interdisciplinary interests.

My search for a thesis topic eventually took me back to my junior independent work on the economic approach to criminal punishment. This theory supposes that at least some portion of criminal behavior is rational and responds to certain incentives in a predictable way, which would have several important implications for law enforcement and other aspects of public policy. My earlier research in this area had built heavily on some of Levitt’s work, which, although I didn’t know it at the time, would lead to a thesis that would be quite timely when his book later topped the bestseller list. At first I had been reluctant to return to my junior paper topic, since a comprehensive junior paper may not leave much room to expand upon. However, I came to find that building upon my previous work would yield two significant advantages: first, it would give me a topic which I already knew would greatly interest me; and second, because I was already very familiar with much of the vast literature in this field, I would be able to devote more of my time to expanding upon that literature with my own original work.
The economic analysis of crime has both microeconomic and macroeconomic components. The microeconomic analysis examines the decision to engage in criminal activity at the individual level. For some individuals, participating in crime will be a rational decision, in that even after accounting for the possibility of being caught and punished, the payoffs to criminal activity may exceed the wages received from legitimate work and the psychic value placed on additional leisure time. This model of the individual crime decision makes three important predictions. First, as an individual’s legitimate work opportunities increase, incentives for engaging in criminal activities will decrease; this means that increases in an individual’s education, work experience, or health and vigor should reduce participation in crime. Second, the incentives to engage in crime will be higher when the returns to crime are higher, so holding all else equal, we should find more crime in rich communities, where there is more wealth to steal, and more crime being committed by the poor, as they have less to lose from jail time and greater need for each additional dollar. Third, and most important, individuals should commit less crime when the probability of being punished or the amount of punishment is increased.

The macroeconomic analysis explores the interaction of crime and law enforcement on the aggregate level. While crime imposes tremendous costs upon society, the social costs of crime prevention measures (including police and prisons) can also be very substantial. These two competing costs imply that there exists a socially optimal level of law enforcement, above which the costs of additional enforcement will exceed the gains. It will not be efficient to try to catch every single criminal, nor will it be efficient to use excessive or draconian punishment when the form of punishment (such as imprisonment) is costly to administer. Identifying the optimal probability and severity of punishment for a given crime poses a difficult challenge for policymakers.

After constructing a formal model and deriving these predictions, the second half of my thesis consisted of several empirical tests to examine the strength and accuracy of the model’s predictions. After combing through all of the crime data I could find online (a somewhat morbid task at times!), I eventually managed to collect three different data sets which I could use to test my model. I thought it important to begin with three different options because I was concerned that one or two of the analyses might not work out. Somewhat miraculously, all three analyses worked out beautifully.

The first empirical analysis combined data on crime, income distribution, unemployment, and government expenditures to perform a state-level macro analysis and found consistent evidence of the deterrent effect of law enforcement across a wide variety of econometric specifications. The second analysis looked at comprehensive individual-level data collected by a federal government survey in the 1980s and found very significant evidence that an increased police presence deters crime; that better labor market opportunities (as measured by an individual’s age, education, health, and local unemployment levels) result in
lower crime; and that greater returns to crime (measured by the local mean income) correspond to higher crime rates. The third analysis looked at an exogenous increase in the punishment for illegal use of the narcotic oxycodone—a change I became aware of through a fortunate coincidence during a summer internship at the U.S. Attorney’s Office—and found that the increased punishment resulted in a decrease in the number of oxycodone crimes relative to other narcotics and to similarly punished non-narcotics.

Those students who select their topic early may be lucky enough to request and receive a specific adviser; but in my case, because I hadn’t settled on a topic in time, my adviser was assigned to me by the department based on our similar research interests. As someone who tends to be mostly self-motivated, I was fortunate to receive an adviser who was willing to take a hands-off approach and allow me to work at my own pace, but some other students may work better when faced with rigorous weekly deadlines. If possible, I recommend approaching professors you know to ask about their research interests and advising styles and to see if they’d be willing to advise you if they seem like a good match.

One more word of advice: while many students come away from Princeton with a well-honed sense of just how much they can procrastinate while still making a deadline, the thesis is not a good time to keep testing those limits, as a project this large is likely to encounter obstacles and delays that one doesn’t face with smaller assignments. As my thesis developed, I occasionally found myself questioning something I had written weeks or months ago and needing to redo some of my earlier work. Some of the data that I requested early on didn’t arrive until perilously close to the final submission deadline, which left me drafting new material uncomfortably close to the due date. And my plans to get some important work done over spring break were abruptly derailed by a nasty bout of the flu. Even the most diligent students may find themselves unexpectedly making a series of last-minute revisions the night before the thesis is to be submitted to the printer; that, too, becomes one of the most memorable parts of the thesis experience.

The senior thesis means different things to different students. For me, both the substance of my thesis and the lessons it taught me have proven quite valuable during my first year of law school. In any case, the thesis will be what you make of it, so plan wisely and make the most of it!

Marco Battaglini
Assistant Professor of Economics

One of the pleasures of advising senior thesis writers is to see them grow intellectually and gradually become more confident of their work and of themselves. Some students start by seeing the thesis as a hurdle; as they penetrate the material that they have chosen to study, however, they enjoy
the work and become enthusiastic. It is a wonderful experience for the adviser because every student goes through it in a unique way.

With Scott Noveck it was different. In fact, I can candidly say he did not give me the same experience because he showed an unusual enthusiasm, maturity, and knowledge of the material right from our first meeting. Scott told me he wanted to apply economics to study criminal behavior. I was intrigued by the topic because I believe economics is not defined by the issues that it studies, but by the techniques that it employs and the underlying assumption that humans are driven by self-interest. Scott was very enthusiastic about this issue because he was considering attending law school after Princeton, and because this was the topic of his junior paper. In his senior thesis he intended to improve his previous work and extend it both by deepening his theoretical understanding of the issues, and by trying new econometric approaches to test the theory with data.

He organized his thesis in two parts. The first part surveys the theoretical literature and develops a framework that can be used to interpret empirical evidence. The economic theory of crime suggests that criminals should be considered as rational agents who respond to incentives (what is the expected benefit of a crime? what is the expected cost?). This approach generates a number of testable hypotheses (how reactive is the “supply” of criminal activity to enforcement?) and, perhaps more importantly, policy implications (how should we design punishments and implement enforcement optimally?). To evaluate the assumptions underlying the theoretical analysis and its results, however, it is necessary to test the theory with real data.

The second part of the thesis is devoted to empirical analysis, and it presents Scott’s most original work. Two approaches were used. First, Scott compiled a new panel of state-level aggregated data for the years 1994 through 2002 and used it to analyze how criminal activity can be explained by police enforcement and demographic variables such as median income, unemployment, and income inequality. Armed with the new data and the latest techniques to identify the correct causality, Scott was able to present evidence against a result suggested by others in previous research: that income inequality is a significant variable that explains crime. The second approach was to study the same question using micro data: that is, data available from the National Longitudinal Survey of Youth 1979, which collects interviews of randomly chosen individuals from 1979 through 1994. The two approaches are complementary: micro data is more detailed, but less reliable because it is based on the sincerity of the respondents. Scott shows that—roughly speaking—results do not change when the source of data changes. In both cases he finds supporting evidence for the economic theory of crime.

My favorite section of this thesis is the last. Here Scott employed a very creative idea to test if criminal activity is reactive to the severity of punishments. Oxycodeine is a powerful narcotic that may be used illegally as a recreational drug. In 2004, sentencing guidelines for illegal possession of the drug were revised,
making punishment more severe. How did illegal trafficking change? Scott noted that since 2004, trafficking in oxycodone substantially decreased. Apparently, therefore, the change in the guidelines worked. It would have been tempting to stop here and list this piece of evidence in support of the economic theory of crime. Scott, however, compared the trend in oxycodone with the trends in trafficking in other drugs that were not affected by the change in guidelines. Once this was done he could not see a statistically significant effect any longer. Scott was not shy to admit that the data did not allow drawing a conclusive result about the impact of the change in sentencing guidelines.

There are three features of Scott’s thesis that I think define a successful senior thesis: hard work in collecting data and other primary sources; creativity in finding new ways to use this material; and, finally, integrity in presenting findings with no preconceptions and without overstatement.

To evaluate the assumptions underlying the theoretical analysis and its results, however, it is necessary to test the theory with real data.
Has Tayo been sleeping and eating—how did she manage to complete all of this?” asked a friend from Pratt Institute in Brooklyn. Laughing, my mother replied, “she eats, sleeps, and does everything else right here.”

Here was 185 Nassau St., the building that housed the Program in Visual Arts at Princeton. The location was ideal, far enough from my room that I would spend hours working at a time, and close enough for quick runs for books and food. Just across the street, I befriended employees at Cox’s Deli and CVS who knew me for purchasing ginger scones daily and green tea—by the gallon, if not more. And if anyone needed to meet with me, especially during those last couple of weeks in April, there was no place more appropriate than the first floor lobby.

This is just partially why, in another friend’s words, my senior show “seemed like a five-year retrospective,” though the work was created in the span of a year. My show really benefited from outstanding working spaces, incredible resources, and the faculty members, no fewer than 10, who were genuinely interested in my work. Not only were they interested, but they made themselves available for studio visits and discussions regularly.

As a Program 2 art and archaeology major, my senior thesis necessitated a conceptual body of artwork to be displayed in my first solo exhibition. The primary struggle was to find my own voice via painting and sculpture. I had no obligation to write, aside from a title and an artist statement, though each studio visit (since my junior year) resulted in more names and exhibitions for me to research. Serious “Googling” of notes scribbled in my sketchbook began in the spring of my junior year.

That summer I had three major undertakings planned in the hope of hitting the ground ablaze in the fall. First, I spent six weeks at the Yale/Norfolk residency program in Connecticut. There I was, just two days after my last exam, in freezing Norfolk with 25 other artists from all over the place. What an incredible experience! I met some fantastic people who shared all sorts of knowledge with me about technique and the logistics of the art world. Also, while learning about painting, printmaking, and photography, I honed my interests and my standards for artwork—both aesthetically and conceptually.

Three days after returning from Connecticut, I spent two weeks in Jamaica, and four weeks in Nigeria—the birth places of my mother and father, respectively. In Nigeria I had the opportunity to spend a week learning how to weave baskets and observing the creation of various fabrics. Both trips became investigations of my heritage and of the connections that I felt to these places. Most importantly, I began to ask questions of how such inquiries might be incorporated into my art. Speaking with various artists about their work, I also began to consider craft and utility versus fine art. The summer filled me with tons of thoughts, but the manifestation of my
ideas in my artwork was a bit more complicated, spontaneous, and much less literal than I'd anticipated.

I spent a ton of time reading, based on conversations with my advisers. During these discussions, the 1993 Whitney Biennial exhibition was mentioned more than any other. The exhibition followed an era of feminist art and showcased artists who embraced identity in their work. As a black woman, many felt that my work would be identified with such a trajectory, and thus knowledge of such history was obligatory. I read the catalogue, along with reactionary articles. I took notes and noted my own conclusions. Writing thereby became a part of my creative process, rather than a separate entity.

Upon returning to Princeton in the fall, I was filled with ideas that were much more complex and specific than those of my junior independent work. My focus became an investigation of myself, and how such details inform how I see and understand my surroundings.

In my first week, I also transformed the studio into my space by creating my reference wall. I collected all sorts of images and objects and arranged them in one funky composition. There were pieces of West African fabric adjacent to large burlap coffee bean bags, postcards, and pictures. Things overlapped, protruded from the wall, and extended onto the floor. The white of the wall was colored and given dimensionality, and I had a wall of stuff creating a comfort zone. Once this task was complete, I began making sample works, which were more like tiny experiments—just small enough that I could hide them if they turned out to be mini disasters. Surprisingly, a couple of them ended up in my show!

There were also fall nights when I would just sit down in my studio and think. I'd literally place a stool in the center of my studio and gaze into space for up to three hours. With one of four sketchbooks open in my lap, I would write ideas and create thumbnail compositions to be transformed into large paintings. I also read and typed on my computer. I learned of Kiki Smith, Charles Ray, Byron Kim (whom I actually met at 185!) and others. After accumulating a month's worth of notes, chapters developed. The whole process was very organic.

So, a bit of advice for seniors based on the experiences I've shared so far: Do lots of research and try things you're sure won't work. Also, make sure you're asking a question that you're interested in. If you're obsessed, that's even better. Don't fight spontaneity. Take time to step back and observe what you've done and any connections happening unconsciously. Ask questions incessantly and constantly reevaluate your conclusions.

During non-productive stupors, I'd also play with words that described the images I referenced by brainstorming for new words and reconsidering tenses. A friend also armed me with a fantastic list of ways to end dry spells in the studio. One more thing: Use your friends! They know you and the good ones are always willing to help. Around December my habits for generating ideas paid off and I was pumping out pretty humongous paintings. And the paintings were cluster-
ing like chapters.

Transitioning between works, it was so important for me to have my studio—it would’ve been impossible to create my work without it. Clear, uninterrupted thought is essential for productivity, and many hours at 185 had much less traffic than most places on campus. Generally, there are all sorts of nooks and crannies where we seniors found ourselves thesising (a verb describing the thesis grind). Often times, the right place varied depending on whether I was typing or painting. To future seniors, I strongly recommend finding one or more hideouts that work for you—sooner rather than later! There will be days when you won’t want anyone to find you.

Benefiting from my extensive thought process, my progress from junior year was obvious mainly because the work I’d created was much more considered. In terms of size, my work grew from an average of 8 x 10 inches to 60 x 48 inches. Additionally, rather than settling for depicting what I had before me, my work challenged representation by playing with dimensionality and pattern. These developments were also informed by challenging questions posed by my advisory board, headed by my two primary advisers, Greg Drasler from the Program in Visual Art, and Rachael DeLue from the Department of Art and Archaeology. They possessed a wealth of knowledge and seemed to know something about everything. Other faculty members and staff members with no obligation to assist me were gems as well. Never had the genuine support of faculty members from disparate disciplines been so instrumental.

Completing my thesis was unlike any journey I’ve had in life. It’s impossible to describe the feeling of accomplishment after the invites were out, the show was hung, the food was ordered, the catalogues were printed, and my guests had come and left. I was really touched by the number of people who supported me throughout and came to celebrate with me at the end.

A couple of last tips to upcoming seniors: Make your thesis your own, your baby to nurture, something that you’ll be proud of and will stand out among your memories of Princeton. Be a trailblazer and speak with anyone who’s willing to listen. If you put in the effort, you’ll be astonished by how many faculty and staff members you’ll recruit to your cause.

Rachael Z. DeLue
Assistant Professor of Art and Archaeology

I best begin with a confession: When Temitayo Ogunbiyi and I met for the first time to discuss her senior thesis project, I felt redundant. That is, Tayo had it all together—she knew what she wanted to investigate and had a pretty good sense of how to go about doing so. My suggestions regarding what she might read or with whom she might speak were belated: she’d
already read it, or she’d already scheduled the interview. What struck me as potentially productive avenues of inquiry—well, she’d already traveled down said paths.

But, of course, Tayo didn’t have it all together and I, thankfully, wasn’t superfluous. In fact, one of the greatest pleasures of advising Tayo’s thesis (and of thesis advising more generally) consisted in watching the project transmute and transform over the course of the academic year: witnessing Tayo figure out that what she initially thought she was most invested in wasn’t, in fact, the thing that would hold her interest and sustain her intellectual curiosity in the long run. Having a sense of what she wanted to work on and think about from the outset was extremely useful for Tayo, but equally essential to the success of her project was her willingness to change course when the material and her sense of it demanded that she do so. Willingness, but also insistence: despite my first impression, Tayo was in no way convinced, at that first meeting, that she knew exactly what she wanted to take on as a topic and she compelled herself, then and throughout the process, to look elsewhere and at other things so as to ensure that she was on the right track and that she wasn’t missing anything or taking the path of least resistance. My role, at least in part, was that of an instigator and devil’s advocate; as soon as Tayo and/or I sensed that she was becoming too comfortable with an idea or a particular approach, I posed new questions or pointed out alternative ways of understanding her topic or her findings. This was the case for each of the two components of her thesis project: her research on identity, art-making, and art history, and her own multimedia studio work, which culminated in a springtime exhibition entitled “Extended Extensions.” This kind of consistent and sustained questioning—of what one reads, what one thinks or knows, and what one assumes—wound up being essential for Tayo, and might serve as a useful model for other thesis writers, for it laid the foundation for probing, flexible, and original thought.

Traditionally, the discipline of art history has organized itself and its objects of study in terms of chronology, style, geography, and/or nationality. More recently, scholars and critics (of 20th- and 21st-century art especially) have categorized and interpreted art in terms of ethnic or racial identity. This trend was Tayo’s starting point; taking the 1993 Whitney Biennial as her main object of inquiry, she hoped to explore and analyze the nature and implications of looking at art through such a lens (the 1993 exhibition was notorious for doing just this) and to characterize how such looking explicitly or implicitly structures the way scholars, critics, and audiences perceive and describe the work of contemporary artists. Choosing to configure her research and writing around a single exhibition was strategic on Tayo’s part. One problem that students confront in defining a thesis topic is that of scope or breadth; proposed topics are often too broad or too general, and much valuable time is spent narrowing and paring down. The case-study strategy adopted by Tayo established, in one fell swoop, both focus and the parameters and boundaries of her research such that she could identify the
I am delighted that Tayo plans to pursue a career in the arts, for this guarantees that our conversations will continue.

limits of her investigation and work appropriately within them (the danger of no limits being the inability to know when to stop reading/researching and start writing).

One of the strengths of Tayo’s project was that it didn’t limit its analysis to categorizations of race and ethnicity. Along the way (and because she left herself open to new ideas) she realized that to discuss the place and impact of only one identity category within art history would be to reinforce what she saw as the essentialism of art histories organized around race or ethnicity; she also determined that art historical categorization was far more complicated and multivalent than she had initially imagined. As such, her work wound up considering not just race and ethnicity, but a whole host of overt and conscious as well as unconscious or surreptitious categorizations that define and propel the fate of art in multiple contexts— institutions, the marketplace, and the academy—including religious affiliation and class. One of the things that I have found most compelling about Tayo’s studio work is its engagement with circulation systems: the way in which products, ideas, and images circulate in a global marketplace. What Tayo says about circulation in her art—that it isn’t seamless or neat and that it can involve rupture, fragmentation, violence, or misrecognition—speaks eloquently to the difficulty, even perversity, of defining or knowing identity (national as well as individual) in the 21st century, and the error of seeing and engaging with others only in terms of the identities we impose on or ascribe to them. Her use of her own body and the bodies of others—a childhood scar, the facial features of friends and acquaintances—as motifs and design templates in her art even as she refused to reduce this art to a matter of autobiography is a testament to the understanding of the instability and duplicity of identity that she developed and refined as she conducted her thesis research.

As I see it, one of the most difficult things about advising a senior thesis is the balance that one must strike between strategic guidance and the encouragement of independent work. In some cases, this means that I must bite my tongue when a student develops an argument (a good one) with which I do not fully agree or when a student finds fascinating a particular aspect of a topic that, to my mind, is less interesting than other questions or problems posed by that same topic. I found myself in the latter situation when working with Tayo, but she always managed to convince me of the worthiness of her fascinations and to make me fascinated too, and from this—from being forced not to see everything through the lens of my own particular investments and interests—I learned a great deal. Seeking to strike a balance between assistance and independence also means that I must refrain from helping a student too much; every faculty adviser, with enough input and advice, could shape any given senior thesis such that it would resemble what he or she would write and publish if the project was his or her own. But too much advice precludes learning; it prevents the student from
figuring out how to solve problems and answer questions on his or her own and it suppresses the honing of an individual’s own scholarly method and voice. On occasion, this means that the thesis falls short of an adviser’s expectations (not at all the case with Tayo!) because the student does not succeed in producing a work original in method and/or thought. Usually, however, striking this balance means that one assists and enables the advisee’s ongoing transformation from student to scholar, as happened with Tayo. This, to my mind, is the most rewarding and exhilarating part of senior thesis advising—this, and the fact that, because Tayo proposed her topic and formulated her own questions, I didn’t know the “answers” in advance: at each step of the process I listened in and learned and did so, well, for free. Not a bad gig, this.

Working with Tayo was a wonderful experience. Our conversations were lengthy and lively and my visits to her studio, some of which lasted two to three hours, were incredibly enriching, not least because I was party to her work at various stages of completion and treated to eloquent and critical accounts of just what motivated a particular artistic choice: why this fabric or pattern, why that frame, why that hubcap or photograph or pair of jeans. Our discussions in the studio were wide-ranging—from specific and directed analysis of a particular work to consideration of the relationship of her art to issues she was engaging in her thesis research—and always illuminating for both of us. I am delighted that Tayo plans to pursue a career in the arts, for this guarantees that our conversations will continue.

Greg Drasler
Lecturer in the Council of the Humanities and Visual Arts

Advising senior thesis candidates has given me the opportunity to provide the most ideal and open aspects of myself for the student’s use. Slipping into the jet stream of a student’s thoughts and aspirations has helped me share a dialog and deliver feedback from outside of their forming aesthetics but from inside of their practice. This process adds resonance to my studio class work in validating what I see as the wide interest in creative self-expression among students. It reminds me that if I am not learning, I am not teaching.

Receiving proposals for thesis advisement in the visual arts program can reveal a variety of personalities and aesthetics from the start. Sometimes, a clearly articulated and enthusiastically delivered proposal met with eager and enthusiastic acceptance can leave a student transfixed in the headlights of her own great idea. Conversely, an occasional slow dragging sound approaching my office door announces a student’s presentation of a sheer mountain of accomplished work for consideration. The drawings, notebooks, paintings, sculptures, videotapes, graphic novels, and websites presented actually and digitally can be intended to demonstrate a commitment and point of view. It also can reveal
someone so immersed in the habit of making art as to be practically mute in the
discussion of it.

I frankly am moved to engage with any student who expresses the bravery
and will to take the risk of self-expression seriously as embodied in the produc-
tion of a thesis. The commitment to develop and understand their own creative
idiom through a studio process will inevitably draw strength, inspiration, and
intuitive insight from their sometimes compartmentalized lives. Being a part of
that conversation through the generous sharing of their accomplishments and
their anxieties in moving forward, I am provided with the greatest opportunity
for high-end dialog. I enjoy everything about this process, including a student’s
first questions and proposals.

Extraordinary technical ability can also arrest my attention. This is how I first
came to know Temitayo Ogunbiyi. Tayo not only exhibited a sensitive ability to
paint but proved to be the most personally and socially engaged yet intellectu-
ally and poetically demanding student that I have ever worked with. As a young
African American woman, accomplished and ambitious, she was leery of defini-
tions. Through a wide range of materials and forms, she continued to elliptically
orbit around her core questions and concerns about the social inevitabilities of
identity and a reductive closure it can impose. This provided our conversations
with a delirious level of equivalences. Invented patterns, found hubcaps, soft
tattered frames commingled with portraiture and eventually sculpture. Thus the
weave, a central element and activity in her work, has come to be the greatest
conceptual and syntactical device for her work to date. Tayo was unwilling to rule
out any possibility. I tried to make useful suggestions but I basically attempted
to keep up with her work.

My anxieties in witnessing Tayo’s continual reach for yet new materials and
forms from week to week was held in check by my greatest struggle and chal-
lenge; not to get in the way of the blossoming of these forms and expressions as
they piled up around her studio. I strove to provide advocacy, criticism, audience,
and technical advice. I was operating as a consultant.

Tayo’s thesis viewed as a community of works accommodates the cultural,
racial, sentimental, and critical expressions that are manifest in her life. The pat-
tern, the weave, the found object, and recycled clothing were the techniques
and materials fundamental to her process, developing an aesthetic accom-
modating self-examination, social interaction, and formal commentary. Each
piece took on the stature and provocation of an entity or personage. Painted,
sewn, woven, printed, stacked, and simply hung, Tayo came to understand how
interrelated, how in conversation her work was with itself, thus growing into the
model of community, a form that she most admired. These works speak about
identity, beauty, symbolism, desire, history, and sentiment through a harmony
of difference.

Sensitivity to material, formal and symbolic differences, exquisitely expressed
the anxiety and delight in refusing to be defined; yet Tayo also refused to give up
the encoded flowering of her delight in symbolic expression. Tayo confided to us during the oral examination of her thesis that she looked at all of the work in both main galleries as one single piece. In fact she said that she was having a difficult time stopping her studio work. Tayo has arrived at a place in the act of making, of thinking through the art object. The potentials, playfulness, and humor presented by her own choices underpinned her self-confidence, bravery, and aspirations to say more.

Advice that I could passionately give to any student entering this process of formulating a proposal for a thesis is this. Pay attention to those thoughts or ideas that you will have that return to you unexpectedly and somehow more poignantly. Find a subject that keeps you up at night and forces you out of bed in the morning. In other words, notice what you notice. Begin as soon as you read this. The reason that I am recommending this now is that in the very middle of producing your thesis you will ask yourself, “Why am I doing this?” I suggest answering this question up front to the best of your abilities. Know what your personal investment is in the subject of your thesis. This cannot be researched but requires plenty of attention.
I decided to major in anthropology because, above all the departments I was considering, it seemed that it would create the best environment for a fun and original thesis. I was very interested in writing and saw an anthropology thesis as an opportunity to be creative with both topic and style. At the time I didn’t even have a topic in mind.

In my courses in the anthropology department we learned about cultures in the Amazon, Haiti, Papua New Guinea, and many cultural “others” in far-off lands. But I always wondered why we didn’t talk about the diverse cultures and ways of life that surround us every day in America.

This diversity had become quite clear when I arrived on campus as a freshman. I experienced what is commonly called “culture shock.” Coming from a small town in Montana to suburban and posh Princeton seemed to me as unsettling as if I had gone to a foreign country. Princeton’s undergraduate body is as close as you can come to a microcosm of American and world cultures in a collegiate setting. Despite all the “American” similarities, it was the stark differences I saw that got me thinking about “culture.” My thesis allowed me to explore this in depth.

I chose my thesis topic, high school rodeo in Montana, as I was thinking about a topic for my junior paper. My father and my sister had been very involved in high school rodeo, and I had attended a few rodeos the summer before. I had noticed many things that stood out to me culturally, especially after digging into my anthropology courses. My professor cautions me that the topic might be too large for a junior paper but suggested that I save it for my thesis. I heeded her advice and decided to pursue the more general subject of rodeo for my JP. My junior paper argument that anthropology should be interested in rodeo and the culture that surrounds it laid the groundwork for my thesis.

My adviser, Rena Lederman, turned out to be the perfect guide both for my JP and for my thesis. While she didn’t know much about my topic, she was very interested in it and very encouraging.

Before I returned to Montana for the summer, Professor Lederman helped me to make a fieldwork plan and to get approval for my project from the Institutional Review Panel for Human Subjects at Princeton. I did research over the summer across the state at various rodeos, focusing on high school but attending other levels as well—college, amateur, and professional—to get a broad scope. I employed the fieldwork methodology we had learned in our class, “The Ethnographer’s Craft,” especially participant observation. I did formal interviews but found that visiting—informally interviewing—many people worked especially well. In addition to attending many rodeos as an observer, I took the time to learn how to rope calves and competed in two rodeos by the end of the summer.

It was fun to take what I was learning at Princeton and apply it to a topic I was familiar with, yet, as I would learn in my fieldwork, utterly clue-
less about. Although both my parents and my sister had long been involved with rodeo, I never had except as a spectator.

Throughout my research I learned a lot about the value systems, thoughts, and opinions of the rodeo set—many that went against “mainstream” American thinking, if there is such a thing. I also learned that a culture is not easily defined because different cultures intersect daily and influence one another. Just because some of my informants were members of the rodeo culture doesn’t mean that they weren’t members of other cultures. This overlap of cultures became clear through differences of opinion and made me look at culture in a new way. But it would be during the writing process that my ideas and theories became strong and coherent.

As I wrote, my topic allowed me to feel connected to home while I was at Princeton, and that was important to me. As I worked on my research over the summer, I thought a lot about what I was seeing, but it was at Princeton, far away from the “field,” where I was able to make sense of some of the things I had witnessed and heard. I then understood why anthropologists return from the field to write up their research. There is something about that anthropological distance that is like a clearing of the clouds in your mind.

I found that as I wrote, my thoughts gradually jelled and took on shape. The thesis continually changed as my ideas matured. The thesis I had envisioned as I began to write was drastically different from the finished product.

It was the first time I ever had to work off my own original research and rely very little on other authors, except for theoretical work I used as a frame to hang my newfound ideas on. This created much anxiety and doubt, which I had to move past for my thesis to be successful. For the first time, I was making arguments without the consensus of other authors or researchers, and I had to have the confidence in myself that my conclusions were merited by my research.

My interest in writing also became clear in my thesis. Throughout my courses in anthropology, I found that anthropological writing tended to be dry and frequently obscure. I decided that my thesis didn’t have to be this way—it could be fun to read as well as enlightening. I included chapters of pure narrative to show rather than tell and to offset the more theoretical chapters. Sometimes I talked about my own experiences, which I thought gave my thesis a personal feel and anchored the project in a way that readers could relate to.

Even though I was quite apprehensive about how my thesis would be received, I felt good about what I had done. It is hard to describe my feelings of relief and joy when my professors liked it as well. I had taken risks by choosing a relatively obscure topic, striking out into new territory, and challenging some traditionally held ideas in anthropology. Apparently, the risks paid off.
Looking back, I have come up with a few suggestions for future thesis writers—suggestions that I feel were keys to my success.

First, people often suggest that you choose a topic you love. My advice is to choose a topic that means something to you. When it means something to you, you are connected to it inextricably. I chose my topic because it was a way for me to apply the things I was learning at Princeton to a topic from my home, and that meant a lot to me.

Second, try to think outside the box. Traditional anthropology focuses on foreign cultures. I challenged this by studying a culture very close to me. Plus, I tackled a topic that has seen limited interest by anthropologists. In a way I became a foremost “expert” on my topic, and that’s really exciting. Remember, it’s O.K. to challenge the norm; that’s how progress is made.

Don’t hesitate to use all the resources that are at your fingertips. Exhaust them and move on to the next if you have to. Some resources, such as your adviser, who is likely advising many other students, can really only help so much. My adviser was of great help in preparing my fieldwork. Another great source of help was a graduate student in my department who led our thesis writers’ group and was of tremendous help in the beginning of the writing process, especially in dealing with the anxiety of tackling such a huge project. Another wonderful resource is the Writing Center. I was assigned to a graduate student writing tutor who helped me at the end of my writing process to make sure my thoughts were coming across clearly.

Even with all the help out there, the most important thing to remember is that you and you alone have to write this thesis. My epiphany occurred rather late in my thesis process, March to be exact, that no one could really help me with the substance of my paper. I alone was responsible for the ideas, arguments, interpretations, descriptions, and theories that were put down on the page. It was at that moment that I stopped waiting for feedback on what I had already done and just forged ahead, blindly it felt at times, but guided by my own instincts.

One of the most important things to remember is that the thesis, while technically a finished product, is a process. A process of anxiety, stress, and even discomfort, but it is also a process of epiphanies and insight—insight about yourself and the world around you. You cannot determine what the thesis will be beforehand; you just have to go where it takes you. It promises to be a challenging but excellent journey.

When I turned in my thesis, I felt empowered and greatly fulfilled by this project that was very much my own. The lessons I learned and the work experience I gained throughout the researching and writing of my thesis are now valued parts of who I am.
My best senior thesis advising experiences have involved students who hit upon a topic that truly and deeply engages their curiosity: students who are intellectually and emotionally swept away somewhere wonderful in the process.

As far as I can tell, students’ ability to lose themselves in this way has very little to do with how well they have done in their courses over the previous few years. Occasionally, I have encountered seniors with spectacular grades in their ordinary coursework who nevertheless found thesis writing a nearly insurmountable obstacle; but I have also advised seniors with unremarkable course grades who found the thesis project to be magical, transformative, even liberatory. It was the first time they really “owned” their own education; and they relished both the responsibility and the open-ended promise of their independent work.

The “fit” between person and topic made the difference. Ideally, thesis writers find something in which they have genuine interest and questions—mysteries to be solved, puzzles to work out. While my most successful advisees have worried as much as the next person about how everyone else is doing, their extraordinarily deep engagement with their projects made it relatively easy for them to block out those often-destructive comparisons and focus instead on the satisfying challenge of the task at hand.

I have been very fortunate to have advisees such as Ariel Overstreet. Ariel’s thesis was a wonderfully well-written ethnography based on a summer of fieldwork carried out back home in Montana, where her younger sister was competing in the high school rodeo circuit.

Ariel was intrigued by rodeo’s complex status: both standing for American culture generally (at home and especially abroad) and being a marker of specifically Western regional values and interests. Ariel focused her thesis on high school rodeo. This made sense not only because her family was directly involved, but also because this is the context in which future rodeo performers are trained and in which families and communities become committed intimately. The power of this community commitment was portrayed in a gripping chapter—Ariel’s most difficult challenge—describing the funeral of a teenaged performer that she had witnessed during her fieldwork.

Working hard on her writing—an effort motivated in large part by the ethnographic and personal responsibility she felt toward the many people who agreed to be consulted as “informants” during her fieldwork—Ariel did a wonderful job of conveying the atmosphere of a rodeo competition. Successfully translating regional language and a kaleidoscope of points of view into thoughtful, readable prose—complemented by gorgeous photography—the narrative is integrated by a well executed and quite moving focus on her own homecoming (in many senses of that term). This sort of “reflexivity” (self-reference) is risky and hard to pull off in academic work. Facing that risk in a disciplined way, Ariel used her
own story not simply to hold the reader’s attention but more importantly to provide an informative context both for the ethnographic description and critical methodological analysis.

How was all of this possible? Ariel knew her thesis topic by the end of her junior year. Her junior paper was a review and critical analysis of academic literatures (in anthropology and other fields) on rodeo; that work made it clear that she was well positioned to make an original contribution. As she was completing her JP in the spring, she developed a research proposal and applied both for thesis research funding and for Institutional Review Panel for Human Subjects approval for summer fieldwork. Her summer work was scary, exciting, and very productive. So, when she returned to Princeton in the fall, she was ready to analyze her fieldnotes and other sources, to close in on a thesis “plot”—an argument and outline—and to begin writing up her key case material. An ideal scenario.

Whether or not you have an ideal scenario by September, there are a few basic points to bear in mind. First of all, make thesis work part of your routine. One way of doing this is to make weekly appointments with your adviser for the first half of the fall term. Departmental deadlines often seem distant and, in any case, it is difficult to decide on an adequate pace of work all by yourself. Your adviser will be able to help you pace yourself; frequent meetings at the outset will also encourage you to break your project down into manageable parts.

Secondly, less is more. Students often worry about thesis size: where will all those pages come from? This anxiety leads many students to come up with thesis “padding”—not a productive strategy! Use your adviser to help you define the scale of your project: a focused plan will enable you to develop a satisfying depth of understanding without sacrificing room for creativity and challenge. Students working in fields such as anthropology often recognize that, unlike course papers, theses are built up from smaller “parts” (or “chapters”). Being similar in scale to course papers, these parts are not terribly intimidating. The trick is to work out an overall thesis plot or argument, suggesting the necessary parts and providing the logic of connections (or “transitions”) between them. Once your thesis has a plot, you can safely focus in on its course-paper-sized chapters, and the page worry dissipates.

Thirdly, be flexible (and use your adviser to help you achieve this easier-said-than-done state of mind)! Oftentimes, a promising topic runs into trouble: for example, analytical trouble, or difficulties in locating key sources. It pays to develop a sense of the alternatives from the outset and to assess what sorts of difficulties you might encounter. In any case, when you’re stuck, your adviser may be able to help “unstick” you.
At the beginning of junior year, I was a classics major with no clue about what to pursue for my independent work—let alone for the thesis. From the time I started Latin and Greek in high school, I had been drawn to the study of classics because of the rhythms and sounds of ancient poetry, and in my choice of classes within the major I tended toward the literary and stuck with the great authors—Homer, Catullus, Vergil, Ovid, Horace. I had even rashly declared to a friend at the conclusion of a seminar on the *Aeneid* my freshman spring that I would definitely be writing my thesis on Vergil. Little did I know how far off that prediction would be.

One thought that flitted across my mind from time to time during my underclassman years was that maybe I needed a change of pace; I dared telling myself in those moments of rare lucidity that it’d be nice to tackle something different, perhaps even an interdisciplinary topic that would allow me to tie in lessons learned from several classes. For both of my junior papers in the classics department, I wrote on literary topics (poems of Callimachus and Ovid in the fall, a Pindaric ode in the spring) and had a wonderful experience under the guidance of my advisers; but it was a graduate seminar I took during the fall of 2004 that set the stage for my thesis work. The seminar, taught by Professor Harriet Flower, was an introduction to Roman epigraphy—the study of Latin inscriptions, which yield all kinds of information about religious, political, and socioeconomic developments in the Roman Republic and Empire. It was my first course with Professor Flower. During the seminar’s first few meetings I was excited by the work but intimidated by the prospect of producing an end-of-semester research paper of graduate caliber (gulp). What on earth, I kept on asking myself, am I going to write about, and how am I going to write something intelligent on a subject so vast? The seminar was held in the classics department seminar room in East Pyne, with real inscriptions (owned by the department) surrounding us and available for examination and study. At one seminar meeting, Professor Flower directed our attention to one of the department’s possessions: a stone with a finished epitaph for a certain Primus Apollinaris on the front and an unfinished (and unpublished) epitaph for a child named Venustus on the back. She encouraged me to work on the stone. I took her up on the offer.

I submitted a 25-page paper for the class that commented on the material, historical, and paleographic aspects of each side of the stone; discussed the familial and social networks coded in the two inscriptions, focusing in particular on issues of nomenclature (we can infer a fair bit from the names of the people in these inscriptions); and considered the vital role of inscriptions as markers of social status for slaves and freedmen in Rome. While writing the paper, I put up all these drawings and photographs of the stone in my Robertson study carrel, earning me the laughter (and pity)
of some of my friends, who saw my annotations on the sides of the drawings as the scrawls of a madman.

Turning over the paper in my mind after Dean’s Date, I kept coming back to a set of thoughts. The first was that the experience of researching the paper and studying the stone on which these two epitaphs were carved had easily been among my most fulfilling academic experiences as an undergraduate up to that point. The second thought was that I could have done a better job researching and writing the paper; I was somewhat dissatisfied with having had only about a month or so to research and an additional month to write. With that sense of dissatisfaction also came some ideas for future research: one topic I had stumbled across during my write-up of the seminar paper was the field of marble provenance studies and the use of a scientific technique (isotope ratio analysis) to determine where marble for a specific stone had been quarried. While undertaking my research, I began corresponding with the professor who taught my lab in the “Conservation of Art” sophomore year, and he put me in touch with a specialist at the University of Georgia’s Center for Archaeological Sciences. With information on the provenance of the marble used for an inscription, I thought that I might be able to reconstruct most steps of the epigraphic process and illuminate the socioeconomic aspects of Roman epigraphy still more clearly.

Much to my surprise, Professor Flower liked the paper I submitted. Even more surprisingly, she encouraged me to expand it into a senior thesis by incorporating research and discussion of three other inscribed stones: two displayed in the classics seminar room and the third displayed in the front room of the rare books department at Firestone Library. The stone I had originally researched and these other three stones—also inscribed with epitaphs—were linked by the common location of their discovery (“in the gardens of Campana” near the Church of St. John Lateran, according to their entries in the Corpus Inscriptionum Latinarum, the published body of Latin inscriptions) and the social status of the individuals who dedicated the inscriptions and for whom the inscriptions were dedicated (first-generation freedmen/women and slaves). I jumped at the opportunity, and so by March of junior year I knew that I would be writing on these stones for my thesis. But I was quite unsure how I would begin tackling them, and in the months that followed I fretted constantly about what aspects of these stones should be the focus of my research. Two topics I knew for a fact would be interesting to investigate in depth: first, the provenance of the marble used for each stone; second, how these stones arrived at Princeton.
of the inscriptions or to myself in the process; but the specialist gave me instructions, and under the vigilant eye of Professor Flower I proceeded to extract samples from each of the stones early in June. I packaged the samples (marble powder residue from the drilling) in thin plastic bags and mailed them to the specialist.

About a month or so later that summer, I was at Middlebury College taking language classes when I received an e-mail. The specialist wrote to say that the package he had received was empty; apparently the postal service had deemed the materials suspicious and unpacked them for inspection (marble powder is a white, fine-grained substance … you get the idea). I was not a happy camper, in part because this meant that I would have to drill the stones again to obtain more samples. It was a moment of incredible frustration, but after I returned to campus at the end of the summer and sent additional samples (this time by FedEx), I could breathe a (small) sigh of relief that the first stage of my thesis research was under way. Two months later I received the results, which were very suggestive: marble for three of the four stones was quarried in Greece, then shipped to Rome.

Fall semester senior year was the single most nerve-wracking stretch of my undergraduate career at Princeton. In a strange way, working on the thesis (and note that I am saying “working,” not “writing”) was soothing, when compared to the other sources of stress in my and my friends’ lives at the time: the job hunt; the endless circuit of fellowship and graduate school applications; the truly terrible anxiety of planning for the future. I met with Professor Flower regularly to talk about my research on the inscriptions, and she was extremely helpful in her wise yet understated manner—pointing me to books on Roman epigraphy, history, and prosopography that I might not have read or topics on which I should be doing additional research; brainstorming with me how I might go about structuring the thesis; and generally guiding me toward a coherent grasp of where my research was taking me. She allowed me to work on my own terms and set my own schedule, trusting me to be responsible and engaged.

The final product materialized in the form of an introduction submitted by e-mail over winter recess and chapters submitted in February and March. Perhaps you think I was on top of my game as far as submitting chapters goes. The truth is, I was not. The first chapter I turned in in early February was incomplete and had to be overhauled. Chapter 2, the core of my thesis, where I reviewed the history of Rome’s marble trade and its use for epigraphic purposes before discussing the provenance of each stone as determined by the isotope ratio results, went through so many revisions that at one point I simply chucked it and began writing from scratch. The third and fourth chapters—which traced the history of the stones from the quarrying of their marble to their carving and installation and (1,500 years
later) their appearance at Princeton—were receiving emergency treatment the week before the thesis was due, and with the typical procrastinator’s penchant for waiting until panic strikes I was working on these up until the very last moment.

My friends and I took photos of ourselves the day we turned in our theses. We all have this dazed look, our eyes incapable of bearing sunlight after weeks and months of staring directly at computer screens. I remember staggering out of my cavern in Robertson, running to get the thesis bound, and then arriving at East Pyne and hurriedly checking the thesis for typos. WARNING: When you are about to turn in your thesis, do NOT do this, since inevitably you will flip out at the first misspelling you find. But once I got over the tragedy of two or three typos and forced myself to submit the thesis to the classics department administrator, I felt absolutely free for the first time in months.

Writing 120 pages on a subject will make you feel academically invincible, at least for a short period of time. The thesis experience was quite unlike anything I had encountered up to that point in my academic career. By guiding me in hands-on work with real inscriptions, Professor Flower opened my eyes to the various and meaningful ways in which Roman epigraphy, history, and material studies intersect. As a result, the final product was fulfilling and harmonizing in all kinds of ways, but the day-to-day grind of writing the thesis was anything but bloodless. Between the sleep deprivation and the utter disappearance of my social life, I was constantly on edge; the panic would peak whenever I had to submit a chapter and realized that I’d forgotten to read a book or omitted important information or—sin of all sins—managed to write sentences in my sleep-deprived stupor whose meaning was absolutely unintelligible.

But even in the grim times there was one thing that made me happy: I had a wonderful group of friends, and we supported each other and vented to each other as we typed away furiously in the bowels of Firestone or the depths of Robertson. I could not have completed my thesis without them. The (perverse?) beauty of the thesis period is how it engenders an incredible, almost euphoric sense of class-wide camaraderie. I struck up new friendships with classmates I did not really know but who became my writing neighbors, in addition to strengthening my friendships with those classmates who loyally and without hesitation checked in on me, fed me, and offered words of support when things weren’t going quite right.

And I was proud of my thesis; to have a bound document in your hands makes you feel like a king, and I was lucky to receive positive reviews of my thesis from my adviser and second reader, who both recommended that I have it published.
My advice to the next cohort of seniors is partly tongue-in-cheek, but quite earnest as well. On some days, your best efforts notwithstanding, you will not be able to write a single word. Perhaps you’re physically tired, or your brain is tired from thinking too hard about the same super-specialized topic and needs a break. So take a good, long nap; then go with some friends to the Bent Spoon. Read a novel from time to time, if that’s what makes you happy, or read your favorite online publication, or play video games. Remember the Golden Rule, which I will amend for our immediate purposes: Offer comfort unto others during times of thesis woe, as you would have them do unto you. Above all, never forget that some aspect of this is supposed to be fun; churning out 100-plus pages will almost inevitably entail the sacrifice of sleep and a (little) sanity along the way, but make sure you’re writing about something that keeps your motor going and your mind engaged.

Harriet I. Flower
Associate Professor of Classics

Dan-el’s senior thesis grew out of a presentation I gave to the junior classics majors in the fall semester of 2005. The presentation was part of our regular junior colloquium, which introduces new majors to different aspects of the field of classics. My assignment was to introduce the subject of Latin epigraphy, which is to say Latin texts inscribed on stone, bronze, and other durable materials, of which we have tens of thousands just from the city of Rome alone. I used some of the grave inscriptions owned by the classics department to illustrate my points: these stones allowed students to examine and read some simple Latin, as written by stonemasons working in Rome in the first and second centuries A.D. At the end of my presentation I suggested that working on several of the classics department’s stones, especially the group from near the church of San Giovanni in Laterano in Rome, would be an interesting senior thesis topic for someone. Dan-el immediately said that he would be interested in taking up the challenge of working directly with these ancient sources, which had not received much attention from anyone else so far.

Dan-el’s thesis offered the first thorough interpretation of four grave stones (three in the classics department and one in the Department of Rare Books and Special Collections in the Firestone Library) from a variety of angles: technical, scientific, paleographic, historical, prosopographic, demographic, and economic. In going into such depth he had to deal with the shortcomings of the standard publication of Latin inscriptions, the Corpus Inscriptionum Latinarum, in which four of the texts had been published about 100 years ago. Three of these inscriptions had been copied down and published incorrectly. Moreover, the descriptions of the reliefs on those stones that were carved with decorations were either misleading or completely inaccurate. A scene of a chicken and a dog was reported
as showing a panther and a crocodile! Even more strikingly, a whole Latin text had been missed on the back of one of the stones. This gave Dan-el a chance to describe and edit this text for the first time and to consider why the stone had been reused for a second tomb in antiquity, while leaving the original text unfinished. He addressed the continually debated question of the format in which inscriptions should be published and how much information about them should be recorded.

His investigation went on to consider how and why these stones were brought to Princeton and displayed by the classics department in different settings over the years. This latter part of the thesis involved research in Princeton’s archives and the reading of letters and inventories to try to piece the story together. In April of 2006, Dan-el curated a small exhibition of the stones in the lobby of the Firestone Library and gave a gallery talk that was well attended by students and members of the community.

For me the best part of this senior thesis was Dan-el’s enthusiasm for the project and his originality in posing so many new questions about these stones. By exploring so many angles he really managed to connect a very detailed study of a few individual texts and monuments with large questions in Roman history, such as the family lives and economic roles of freedmen and the patterns of shipping and selling the marble used for gravestones in Rome. Although I had originally suggested it, this really became his topic. It was he who thought of and managed to organize the marble analysis of the stones, which added a whole new dimension to the evidence he could discuss. Thanks to the analysis done in labs at the University of Georgia, the leading lab for analysis of ancient marble, Dan-el was able to establish that only one of the stones was Italian marble and that the other three had been imported from quarries on various Greek islands. This information shed light on how much the stones had cost and helped to date them, depending on when each type of marble became readily available in Rome. The scientific chapter drew on Dan-el’s work in a seminar on conservation that he had taken as a freshman. Similarly the economic consideration of the marble trade drew on courses in the social sciences.

The social and demographic analysis of the people who were commemorated after death and those who commemorated them really got to the heart of the matter. It also allowed consideration of the lives and families of slaves and former slaves, all living in the same area of the city of Rome in the high imperial period. Some of them were connected to famous families whose members appear in the history books, including the imperial clan of the Ulpii, the family of the emperors Trajan and Hadrian. The unpublished and unfinished inscription on the back of one of the stones was the epitaph of a young slave boy of the imperial household, put up by his mother, who had already gained her freedom. But why was the inscription never...
finished and set up? Did the mother also die soon after her son? Or did she not have enough money to pay for the piece? Or does this text represent a practice piece that an apprentice had worked on, rather than an inscription recalling the memory of a person who had died? Definitive answers are hard to come by. But the second, much longer text, squeezed into a limited space on the other side of the stone, does suggest, as Dan-el brought out in his discussion, that the stone may have been on offer for a bargain price in a shop in Rome.

Dan-el’s senior thesis may seem too specialized or specific to duplicate, but I do think that it offers various insights into what makes a rewarding and memorable senior thesis experience. My advice to a student looking for a senior thesis topic would be to consider the following three approaches. Choose a topic that you are passionate about; in other words, one that really interests you deeply. In the end, it is your topic and you are the one who is going to be writing about it. Then consider a subject that might combine various methods you have learned in different aspects of your Princeton experience. Making connections is always stimulating and rewarding. This may, of course, not be possible. Nevertheless, consider using methods and asking questions that have not been asked before of your particular material. Lastly, give yourself plenty of time, preferably including the summer before your senior year, to think about and design your topic. There is nothing worse than having a great idea about your thesis and then finding that you do not have the time left to pursue what would have been something really original and new. Be on the lookout for topics early and think very carefully about what questions and approaches you want to use. Then the real adventure will begin.
almost became ill when I was asked to reflect and comment about my senior thesis. The thought of that time in my life conjures such violent and tumultuous associations. But, looking back on it is a wonderful thing. I realize I was more proud of my thesis than anything else I did at Princeton. It felt complete. It is important to feel proud of what you do with it. Whatever your thesis ends up being, just make sure you are proud of it. Or proud of yourself for doing it. Hopefully both.

I feel obliged to offer a few kernels of wisdom, although I can’t say I took many of the ones I found in any of the essays I read when I was mysteriously and anonymously mailed this book my junior year. Still: Get to know your advisers. They are brilliant, thoughtful people. They are interested in what you are doing. Also, if you have the option of doing something radical, or seemingly crazy, you should probably do it. Try to travel. Apply for funding. Do your work in a place that you like, and where nobody can find you (deco rate your carrel with W magazine cut-outs and Campari advertisements). Go to the Bent Spoon often. Check out as many books as you can carry. Put yourself into your thesis.

In the spring of my junior year I was fortunate enough to be accepted for the creative thesis in both the Program in Creative Writing and the Program in Theater and Dance. I conceived a vast and outlandish project spanning the disciplines of creative writing, dance, comparative literature, and linguistics. The Department of Comparative Literature offers a number of different tracks for majors; I chose Program D: comparative work in literary and creative arts. I was to write a book of poems (advised by Linda Gregg and Tracy K. Smith), produce and choreograph a site-specific dance show performed at Chancellor Green Rotunda (advised by Rebecca Lazier), and offer a critical and historical supplement centered around the idea of poetry and movement as two mediums expressing one artistic truth (advised and guided by Sandra Bermann).

This meant I had four advisers and a lot of weekly meetings. In addition to actually writing the poetry, choreographing the dances for the show, and researching the history of poetry and dance, I had to think about production, sound equipment, costumes, space permission, and a slew of other things. I had no idea what I was doing. It was utterly terrifying. But it worked out. Miraculously. And that is true of everyone. It all works out. So stop worrying.

I worked very slowly at the beginning. The ideas weren’t coming, all through the fall. I imagined a creative project, but seemed to miss the inspiration needed. So I read a lot of books, seemingly searching for something in all of them. I thought a lot. That part was important, laying the groundwork for when I needed to move really fast later. Things started to take shape.

I wanted the choreography to be based on the book of poems. The historical and comparative essay could only be written once the two cre-
ative components were completed. Which meant a lot of sweating. My advisers were patient with me and very helpful. It came together slowly. The poetry took shape around physical ideas and perceptions of the body in space: a dancer’s perspective. At one point I asked a friend of mine if she would mind if I wrote all over her with a fabric marker, for inspiration. To see what text could do to a living breathing body. The result would eventually become the costumes for one of the dance pieces.

The poems took shape; the dances took shape. The research all revolved around the same focus: the experience of the space, and the self-knowledge it conjured. I was nervous the whole time; I had never put so much of myself into anything. I was so embarrassed about it, but it really was a liberating experience: physically putting myself on display, in every way.

The Fugue State is a psychological condition related to amnesia and multiple-personality disorder, characterized by sudden and inexplicable onset of madness, often resulting in drastic actions and travel away from home (Agatha Christie once went missing for 11 days, totaled her car, and was found living in a hotel under a different name). The subject does not appear to have anything wrong with him; he seems normally functioning, while in fact he has gone completely insane. In short: the experience of writing a senior thesis at Princeton. The experience of going to college. The sensation of feeling completely alien living in your own body. This would knit together many of the ideas loosely circling my thesis.

The convoluted path that led to Fugue State began (I realize now) my freshman year. Confused about Princeton and how I felt about it, being away from home, and feeling very alone gave me a penchant for breaking into building construction sites late at night. I sat on the steel I-beams that would become the third floor of the Ellipse and watched the sunrise. I wandered the hallways of Witherspoon when they were dust and debris, now carpet and wood trim. There was something fascinating about this "unfinished" feeling that was nowhere else present at Princeton. There was no polish to these places, no sheen to the stone floors, no age-old yet brilliantly new oak furniture; they were raw. I knew they would become beautiful finished products like the sparkling buildings around them, but for now all they contained was a sort of not-yet-burnished potential. Which was sort of how I liked to think about myself as a freshman, which is embarrassing, and pretty arrogant. I thought Princeton was this great place that turned people into what they would be. Since I didn't know what that was yet for me (in fact I had no idea, which was terrifying), I just assumed it would happen in due course. And I took to haunting unfinished buildings.

The Chancellor Green Rotunda was under construction my entire first year. It was the most perfect place I could imagine. Even without all the stained glass and with all the sawdust, I could see its potential. If you haven't been, put this book in your pocket and take a walk. More than anything else, my thesis was about that space. Its ability to comfort, protect. A hall of learning. The painful solitude it instills. An almost religious feeling of beauty, grandeur, and education. When it
The poems took shape; the dances took shape.

reopened there was no furniture or rug in the middle of the floor to distract from the mesmerizing patterns in the floorboards. It was open all night. If I slept at all in college, it was little naps under the monolithic floodlight in the middle of that room. I knew I had to write about that space. It begged to be danced in. The result was more than I could have hoped for.

Sandra L. Bermann
Professor of Comparative Literature

I have always enjoyed advising senior theses. I like the opportunity to help students travel into new intellectual terrain and take risks that might not be possible within the ordinary course curriculum. In the process, I always learn something new, not only about my own particular interests, but also about the international and interdisciplinary field of comparative literature. Silas Riener’s creative thesis, with its original poetry, dance choreography, and critical essay, intrigued me from the first. An excellent example of challenging interdisciplinary work, it had the potential to create powerful new art. It could also contribute to current thinking on the interrelationship between literature and dance.

Many fine books have been written about poetry—and dance. But surprisingly few consider their possible connections. With interests in both these arts, I was eager to see what a dancer and poet as talented as Silas might discover. I had seen him dance many times on campus, and I knew of his keen interest in poetry through a junior paper I had advised. But what galvanized this particular project was its courageous scope, along with the combination of intellect, creativity, and passion that Silas brought to it. The combination was exactly what was needed. Not only would his work rethink relations between movement, repetition, lyric, and choreographic forms, it would dramatize ways in which poetry and dance are themselves modes of thinking and relating, modes that can be translated from one language to another. In this borderless zone, where the usual academic divisions no longer hold, one form could lead to, feed off, or metamorphose into another.

Since Silas’s thesis involved creative writing and dance, he had advisers from more than one department. In this case, Tracy Smith and Linda Gregg from creative writing, as well as Rebecca Lazier from theater and dance contributed their extraordinary talents to the project. As the comparative literature adviser, I was there primarily to advise Silas’s reflection on the whole, as this would inform his final critical section. My only real concern early in the year was whether he would find time in his busy performance schedule to put this ambitious, three-part project together. This worry was, I believe, the most difficult part of the advising process for me.

As soon as I had a chance to read a draft of Silas’s poetry in the late fall, and could see its thematic and formal focus on movement, dance, and the
body, I became much more confident that the project would succeed. His unusually mature poetic voice, inspired by the actions and the feel of dance, used themes ("moving in unison at Penn Station," or "fugue"), sentient imagery, and lyric forms such as the villanelle and ghazal as well as free verse, to create a "material" language of action and form. The poetry was soon matched by an arresting dance performance in the rotunda of East Pyne. Drawing upon an energetic and fluid choreography, Silas and his troupe performed sustained geometric extensions, leaps, turns, and simple walks, all in some way intersecting with the themes and forms of his poetry. The audience viewed patterns of movement from the balcony above. Costumes, some inscribed with the poems, some in simple shades of white and beige, allowed the changing human shapes to stand out against the wooden floors and architectural space of the rotunda. Here, pages from the poetry met the language of dance.

Much of the critical essay, written in the final stages of the thesis, was evidently conceived while Silas created his poetry and dance. With little precedent for his work, he nonetheless researched and integrated the wisdom of poets such as Valéry and Mallarmé and choreographers such as Martha Graham, describing these views in the historical portions of his essay. He then added his own insights as poet and choreographer. How did he conceive of the nexus between poetry and dance? And if such interconnections among the arts are available, or even frequently in play, how might they lead to innovations in one, the other, or both art forms? Often, he suggests, a common idea can animate both, inviting linked themes, or encouraging translation and transformation from one to the other. Turning to his own practice, he explains his efforts to draw language and movement not only from the vocabulary of the past, but also from his everyday life. Moving in and out of traditional poetic forms and themes, and through the time-honored dance vocabulary of ballet, Silas signals his historical awareness as well as his own embodied voice. "Translations" also arise between his two creative modes. In the case of his central poem and dance, "Fugue," each dancer translates particular words of the poem into movements. Though Silas's critical essay could, in my view, extend these ideas and examples further, and could perhaps have used some additional reflections upon historical aspects of his topic, it succeeds very well as it stands. He offers a unique, "inside" contribution to our thinking about, and aesthetic pleasure in, the interrelationships among the arts.

Though Silas's work will always stand out in my mind as particularly ambitious and brilliant, it does share some underlying characteristics with other successful theses. It reveals a passion for its topic—and a willingness to push against the borders of current thinking. It also shows a willingness to learn from advisers, yet to pursue a project that is truly independent, making way for new and original contributions. Since graduation, Silas has continued...
his dance training at the Tisch School of the Arts at New York University. I look forward very much to seeing his dance and choreography in the future. Meanwhile, comparative literature has not forgotten him, or what his thesis teaches about literature and dance. He was our featured guest, reading and performing parts of his prize-winning thesis, at our annual student-parent-faculty dinner at the rotunda in February 2007.

Rebecca J. Lazier  
Lecturer in Theater and Dance and the University Center for the Creative and Performing Arts

Silas took his first dance class with me during his sophomore year. He was late on numerous occasions and sometimes didn’t come at all. He was clearly gifted in dance, but he was also gifted in many areas, and dance wasn’t yet the priority for him that it would become. In the following semesters Silas continued to enroll in dance courses, and with each passing week I could see his interest grow. He landed the leads in full dance theatre productions of *Pas d’Acier* and *L’Apres-midi d’Un Faune*, and soon he was 30 minutes early for classes and never missing rehearsals.

It was as if I was slowly watching Silas be consumed by a fire. To see something that Silas enjoyed become a passion that he will pursue has been tremendously rewarding. It wasn’t a requirement for Silas to do a dance thesis, but it was necessary for Silas to do this thesis as he needed to take dance to the next step. To not only be a dancer in lead roles and create dances, but to also create a performance event, provided this depth.

Dance production is a mysterious art form. It involves multiple aspects of the body and mind. At the core of each performance is the choreography, so it was the first priority for Silas to create the dances, but creation was only the beginning. He also needed to create a budget, raise money, rent equipment, book the space, make posters, send out press releases, make programs, find a stage manager, schedule rehearsals, pick costumes, rehearse the dancers, and attend to the myriad other details that can be unforeseen in the beginning.

We would have two kinds of meetings, the practical and the creative. During the practical meetings I would ask simple questions: Have you found a sound system, how are you going to hang the drapes, where are the chairs going to go, can you remove the carpet from the space? In the creative meetings my questions would focus on the dances themselves: How can you make your theme more clear, what are you trying to say in this part of the dance, what about trying a new piece of music? But there was a third kind of meeting that Silas and I had often that fits into neither of these categories. These would happen when Silas would come to my office and wait until I was done with my work, often walking me to my next class, and ask me questions about performances he had seen,
videos he had watched, or an article he had read. He would grill me about what I thought of choreographic structures in Merce Cunningham’s recent show, or how I addressed music in my work, and ask me what shows he should see next. It was during these discussions that Silas was finding a voice of his own.

I found that Silas learned the most when he least expected it. He was comfortable with pushing himself as a dancer in the studio; that was familiar from his background in soccer. He could ask his body to do just about anything, and it would respond. It was harder to find what he wanted to say with dance, to find who he was as a dancer. The creative arts demand that you be vulnerable, that you reveal who you are or how you see the world through your art. In dance, because it is the body itself that reveals and must communicate, choreographers and performers need to have a highly developed sense of self. It is crucial that a dance lay bare the secrets of the heart, that the moving body bring the inner world to life. In the beginning this process was disconcerting for Silas. I remember him asking early in a choreography course, what do you expect of us? The assignment was simple and clear, but he was asking something else, he wanted to know how to make a dance “right” before trying and failing and trying again. A desire to get something “perfect” is the enemy of a creative process. I said, I expect you to dare yourself. I expect you to take a risk. I expect you to discover a dance you did not know was possible. I expect you to fail before you succeed. And in time this is precisely what Silas did. I witnessed Silas shift from a body that enjoyed moving and dancing, to a person who was interested in expressing ideas through dance.

The strengths of Silas’s thesis lay in the boldness of the plan: picking a space that had not been danced in before, doing a complete show himself. He didn’t follow a prescribed structure of what a thesis should look like. Silas had a clear vision of what he wanted, and it was my role to ask him the right questions to ensure that he remembered to attend to the minutiae in order to make his vision a reality. The reward was watching the audience respond to the dances, to be engaged and to be moved.

Silas’s thesis was the first senior thesis I advised. The process was the continuation and culmination of a mentorship that had begun in his sophomore year. Each year in the dance certificate program there is intensive advising in preparation for the Spring Dance Festival performance, and Silas had been part of this process for three years. If there is any advice I have for students embarking on creative theses, it would be to start early, commit to a bold idea, ask questions, demand answers, and know what has come before in order to try something new. You never know how a new dance will turn out, so immerse yourself in discovery.
Since deciding to major in architecture, I knew that I wanted to write my senior thesis on architecture beyond the scale of the individual building, on some sort of issue relating to cities and urban regions. I also knew I wanted to approach this broad field of study as a theory-based and form-based interpretation of a city rather than from a more practical, traditional approach to urban planning. The journey to my specific topic and eventually to the main theses of my research proved a much more tortuous—but very rewarding—journey.

Despite junior independent work focusing primarily on design and visual skills, architecture students at Princeton typically complete written, research-based theses. Dean Stan Allen sees this as situating the School of Architecture’s undergraduate program as part of Princeton’s traditional liberal arts curriculum. I agree with this, but I also see the written thesis as an important opportunity to verbally intellectualize the visual and spatial lessons learned over the previous semesters.

Since studying abroad in Germany, I had been planning to write my thesis about how the physical traces of Berlin’s tumultuous history are legible in the layout of its neighborhoods. My plans changed, however, while spending the summer after my junior year working in Los Angeles. Every day, I drove through the city and saw the Los Angeles hills looming above me to the north—and I gradually became fascinated by them. I observed how odd it seemed that a mountain range rose so abruptly and incongruously out of the dense, flat Los Angeles basin and began to wonder what the implications of this were to the overall urban structure of the city. Did the hills cause distortions in the street grid adjacent to them? Did they cause social differences between those living in the city and those living in the cliffside mansions hanging above the city?

Back at Princeton, I began to work on settling on a thesis topic and began to research the Los Angeles hills. I made the realization that the hills are often unnoticed but unquestionably omnipresent in the iconography of the city: they seemed to be a stage set that forms the background for life in the city below it. After further examination, I settled on writing my thesis on the hills.

Late in September, I chose Professor Sarah Whiting as my thesis adviser because of her background in urban theory and because we got along well. After a few meetings with Professor Whiting, it became clear that one of the toughest issues of the thesis would be to zero in on a topic, to nail down specifically what questions I was seeking to answer with my thesis.

In order to find an angle to take on the hills, I began to research more thoroughly. I knew before choosing the topic of the L.A. hills that there was not much written about them from a macro-scale, urban perspective. While this did make research rather difficult, I saw the lack of written material on
I saw the lack of written material on the subject as an opportunity to really make a new contribution to the discourse on Los Angeles urbanism.

The one written work that considers the L.A. hills on an urban scale is a chapter from British architectural historian Reyner Banham’s 1971 book on architecture in Los Angeles. Because this book is known as the quintessential work on Los Angeles architecture, I began by positioning my research as a response to Banham, revisiting and reevaluating his questions and assertions 35 years later. Lacking other written works, I turned to different sources like maps, photographs, architectural monographs, and popular films to gain an impression of how the hills exist in the popular imagination of Los Angeles. I also read histories of Los Angeles and novels that mention the hills, and examined data from the city to determine the demographics of the hills in comparison to the rest of the region.

The most rewarding portion of my research came during intersession. I was lucky enough to receive funding from Princeton to spend the week in Los Angeles doing thesis research. It was a very productive week of meeting with L.A. professors and architects. Most of all, the trip was important for visiting homes in the hills and driving around the hills’ streets to observe firsthand how my various theories and ideas about the hills held up.

The most significant challenge throughout the research process was narrowing down my object of study—the Los Angeles hills—to a specific subject of inquiry. Despite a lack of literature on the hills, a thesis describing what the hills are like and why I find them so fascinating would not be academically rigorous enough. I needed to find an angle to take on the hills that would offer an enlightening understanding of a specific issue.

Throughout the process, I kept thinking that I needed to focus on something very specific, such as the role of man versus nature in the architecture of the hills or how the hills are depicted in film. Eventually, however, I realized that being specific does not necessarily mean focusing on a very narrow aspect of my object, but rather, that I could be specific by tying the hills into my broader interest of urban planning. From here, I focused my research and insights on what role the hills play in the entire urban context of Los Angeles, specifically examining what effect the constant visibility of the hills has on the life in the dense city below it, what role the constant visibility of the city from hillside mansions has on life in the hills, and what happens at the base of the hills where these two zones meet.

Throughout the process, I e-mailed back and forth with my adviser multiple times a week with questions, ideas, and drafts. We also met in person once a week for a lengthy discussion of my current progress. Her expertise in urban theory made her a great person to bounce ideas off and gain fresh perspective. Likewise, her experience in pursuing academic inquiry into architecture and cities helped push me to a higher level of thinking than I had achieved before the thesis process began.
... the entire year-long project was an invaluable academic experience, enabling me to push my limits.

In retrospect, I allowed the transition from a primarily design-based mode of thinking to a research and theory-based mode of thinking to take too long; if I had learned lessons about research, writing, and translating visual-based thinking into verbal form sooner rather than gradually over the course of the year, perhaps I could have gone much further with my thesis. Regardless, the entire year-long project was an invaluable academic experience, enabling me to push my limits far beyond what was possible during normal coursework. Because of the thesis, I feel very prepared for the next level of study.

My advice for upcoming seniors is to start early and always have an ambitious, open mind. Push early in the year to get intellectually as far as possible with your subject. Even if you do not see yourself as someone who will pursue academics beyond a bachelor’s degree, see the thesis as an opportunity to work your brain in new ways and lay the intellectual groundwork for whatever you pursue post-college.

Sarah M. Whiting
Assistant Professor of Architecture

I want to write about the Los Angeles hills and their effect on the architecture and urbanism of the city.

It’s amazing how one seemingly straightforward sentence can be so evocative. When James told me his thesis interest, I was transfixed. Los Angeles is not in itself especially novel territory for architectural or urban writing. But the majority of the research done on this city has focused on the homogeneity of the horizontal—the endless and flat repetition of the single-family tract home—the heterogeneity of the commercial—the “pop” of the Strip and the glam of Rodeo—or the alarming privatization of the city with its gated communities, proliferating security cameras, and economic disparities. When geography comes into play, it’s usually been in reference to the beach or the valleys.

James illustrated his initial proposal with a striking aerial photograph of L.A. The hills bunch up, forming stubborn wrinkles in an otherwise flat fabric. They interrupt the seemingly endless street grid of the city but don’t seem to affect it at all, as if they had come after the grid instead of preceding it. What a mystery. Indeed, we soon discovered that the best place for learning about the hills was the mysterious world of L.A. film noir: Sunset Boulevard, Chinatown, L.A. Confidential, Mulholland Drive. Through a combination of studying these movies while also examining specific houses within and atop the hills, James was able to construct a detailed image of a world set apart from Los Angeles but related to it in different ways. Dividing his examples into three rough categories—houses set onto the hills, houses perched onto the sides of the hills, and houses cut into the slopes of the hills—James
Posited that these different relations to the geography of the hills affected the house’s relation to Los Angeles at large because siting had a direct effect on views from each of these houses. James concluded that one could find three different cities in Los Angeles: that of the hills, which offers a wealthy enclave in a more wild, natural setting with the horizontal grid of L.A. as an endless carpet of lights; that of the flat Los Angeles grid, where the hills offer a theatrical backdrop for a social imaginary of both nature and wealth; and a heretofore unarticulated city, that of the transitional zone between the hills and the flats, where there is no expansive backdrop (no grid as carpet or hills as backdrop). This transitional zone constitutes an intriguing, mysterious world precisely because of that lack of long perspective. It is this sense of mystery, of possibility (or danger) always lying just around the next bend, that makes this third, or middle, zone so appropriate a setting for film noir, and indeed most such films are set in that zone rather than at the clear top of the hills or in the flats below.

In short, then, it was through a largely visual study of specific houses as well as the representation of Los Angeles in film that James was able to turn a general interest in the L.A. hills into a thesis about what kind of urban environment the hills offered. James complemented this visual research with statistical information on demographics, tax bases, and density, but the main emphasis of his research was visual analysis, which is one of the foundations of an architecture major’s coursework.

James and another student, Will Marshall, provided my introduction to the senior thesis at Princeton, as this was my first year of teaching here. Unlike my own senior thesis (done ages ago, at a fine institution located in New Haven), where I had been pretty much left on my own to write a long paper, I discovered that the senior thesis here at Princeton really is an extensive collaboration between the faculty member and the student, based on weekly meetings and requiring constant feedback. The Princeton thesis model—close collaboration and guidance combined with the independence of the student’s initiative—is an academic ideal. It’s the kind of intellectual project and exchange that most graduate students across the country dream of and never obtain, let alone undergraduates! Having done it once, I feel slightly better able to know when to offer advice and when to let the student forge ahead on his or her own. Finding the parameters that best guide and encourage independent work is the hardest challenge for the adviser. Having only taught graduate students for the five years prior to coming here, I was also unsure what to expect from an undergraduate, and at times I found myself underestimating or overestimating James’s knowledge and skills. If I could advise James all over again, I would be more demanding in focusing the research question sooner; the difficulty of forming a research project out of a general interest can consume much valuable time during the thesis year. Our frequent communication by e-mail and in regu-
lar meetings, plus James’s ability to stick to a schedule, which is probably one of the greatest challenges of any long-term project, all helped to keep everything flowing smoothly, but much time was lost trying to determine what exactly he would be researching and in what manner.

The confusion we had over research material (Could James read the films he was using the way he reads architecture? Is that a “responsible” way to “read” film? What other material might prove valuable to him?) reflected some of the extra challenges that architecture majors face when doing the senior thesis. Unlike their peers in the humanities, their junior independent work has been a design project rather than a paper, so they have not had the experience of organizing, researching, and writing such a long text. At the same time, their theses are submitted to the same high expectations of deep research, broad reference, and quality prose as those of any other major in the University. Additionally, the architecture majors have the extra burden of having to produce a visually arresting product in addition to an intelligent one, since one thing you most definitely learn as an architecture student is the importance of presentation. James produced a thesis that would turn many an eye in any bookstore: hardbound with a paper dust-cover, and beautifully designed inside, it is a stunning book.

While the pressure of accomplishing such an achievement within an architecture program is a true challenge, it is also precisely what sets the architecture majors at Princeton far apart from their contemporaries at any other school. Students emerge from this program as designers who have accomplished serious independent research. I still find myself thinking about James’s thesis on occasion. I think about points he raised in the thesis, and new points still come to me when I go to L.A. or see images of the city in books or on film. And that, to me, is the real mark of a successful research project: it’s like a good conversation that never ends.
That most lamentable of adages—“well begun, half done”—applies with unfortunate accuracy to economics theses. Happily, the phrase is not “early begun”; and in this context it merely means that the hardest (and certainly the most intimidating) part of the thesis process is coming up with a decent question. With a decent question in hand, though—a question that’s more or less answerable, and perhaps vaguely interesting—the thesis simplifies to the familiar matters of working and hair-pulling.

At least this was the case for me. Although I saw ways to construct a thesis building on my junior paper, I was keen to try something else. In part this was because I did not see much social use in the potential findings of such a thesis (put one way, my JP had analyzed how terrorists could maximize their publicity in American news), but largely, I confess, it was because I was lazy. The topic would have required months of tedious measurement and data entry; and although my JP had taught me the Zen-like virtue of those mind- and hand-numbing hours, I was determined to find a thesis topic for which existing datasets already begged to be downloaded and compiled.

I was also hoping to find a topic that dealt with geography or the environment. After working in Germany for a few summers, I was especially interested in international differences in transportation and land use. Over the summer, I began skimming through journal articles on transportation and energy strategy, land use and agriculture policy, emissions and environmental innovations. Oddly enough, though, the paper that sent me down the meandering path to my eventual topic was written (a) by a macroeconomist and (b) about the labor market. Differences between Americans’ and Europeans’ labor supply choices, the paper contended, could be explained almost entirely by tax policy.¹ I began to wonder the same about environmental choices: Were differences in fuel taxes, say, sufficient to explain why Germans fired up their diesel Beetles only when they knew their groceries wouldn’t fit in a bicycle basket?

I never answered that question, although the results of my thesis provided some hints. Instead, I scrapped the international focus for a domestic one and homed in on the gasoline market. How responsive were Americans to gasoline prices? Would raising the gasoline tax be effective in reducing U.S. oil consumption? Neither of these were novel questions—but no one seemed to have posed them as separate questions.

The more I examined the literature, the more worthwhile it seemed to try separating the questions. Economists’ estimates of the price elasticity of demand for gasoline—that is, how much people’s gasoline consumption responded to prices at the pump—differed by region, by time, and by

methodology, but all the estimates were pretty low. Some rough extrapolations from the one study I found on consumers’ response to gasoline taxes, however, made it seem plausible that demand might be more responsive to price changes caused specifically by a tax.

This tiny conjecture opened into the scope of my entire thesis. The price of gasoline is not just a price: as political commentaries in the fall of 2005 so frequently pointed out, it is a function of taxes, world events, the availability of crude oil, even the weather. Once I’d convinced my adviser that my question was worth pursuing—and he was not persuaded the first three or four times I pitched it—I set out to test whether all price fluctuations, and specifically those arising from taxes and the price of crude oil, were equivalent in the eyes of the consumer.

It turns out—to jump over a few months of data-crunching—that they’re not. When the price at the pump rises because a state has increased its gasoline tax, consumers reduce their gasoline consumption by a factor of two or three more than they would if the same gasoline price increase had been driven by the price of crude oil.

When this result first shot across my computer screen, I regarded it with hopeful nervousness, and as the result held firm through revision after revision of my model, that feeling solidified into nervous hope. The coefficients jumbled in my Stata printout had a cheerful implication—namely, that taxes might be more effective in reducing gasoline consumption than standard measurements of price elasticity suggest.

Before the nervous hope, however, came the other half of the work. The fantasy of drawing all my data from existing datasets imploded when I realized that no one had taken it upon himself to publish a pretty table of state gasoline tax rates by month. For several eons, therefore, I worked on chasing down the date of every change in every state’s gasoline tax between 1989 and 2003. Apparently not many people care to know what day in 1991 New Hampshire’s gasoline tax rose from 16 to 18 cents per gallon, because it took me a full afternoon and a chat with the New Hampshire state library to find out. By the time I was done, I could quote the tax on regular unleaded in Arkansas at any time in the past decade, but not the current rate for a gallon of gas on Nassau Street. (Caffeine, however—the more relevant fuel—was going for 80 cents per liter of Diet Coke.)

When it came to setting up a model for the data I had spent so long collecting, my adviser’s guidance was invaluable. Professor Henry Farber steered me patiently toward a more expedient specification for my regression, and his experience with data riddles got me through many a problem. If you’re lucky—and I was—your thesis adviser will be someone who can point out when you’re going about things backward; when you’re being stupid; and when you’re being really, really stupid. As it turned out, I was extremely lucky, because often Professor Farber also showed me how to stop being backward and stupid.

In the end, I must admit, my thesis did not leave me with any sense of its quintessential Princeton-ness. Perhaps this is because I never ventured into my
If you're lucky—and I was—your thesis adviser will be someone who can point out when you're going about things backward...

Firestone carrel. (I peered inside it once, felt the crush of cold metal and doom, and fled back to the sunlight and construction noise of my dorm room.) Perhaps it's because other worries prevented me from devoting myself to a Quintessential Thesis Panic.

Or perhaps it's because my thesis has not really "left" me at all yet. Instead, it's pestered me with new questions: Why do consumers react more strongly to tax-driven changes in the gasoline price? Could this stronger reaction explain why Europeans appear more price-responsive than Americans?

As satisfying as it was to turn up a hopeful result in my thesis, the biggest rewards have been accruing in the form of new research questions.

Henry S. Farber
Hughes-Rogers Professor of Economics

The junior and senior independent work required of all students is, in my view, the signature characteristic of a Princeton education. In my 15 years at Princeton, I have supervised senior theses on a wide range of applied topics in economics, and supervising these theses is always a rewarding intellectual experience for me and (I hope) for the students.

I look for promising advisees early, and I confess to having an advantage in this search. I teach an upper-level undergraduate class called "Econometric Applications" that I developed when I arrived at Princeton. This course teaches students the subtle art and science of statistical analysis through hands-on experience with a large number of data sets that can provide insight into interesting issues, not only in economics but also in political science and sociology. I find interesting advisees among the students in my class with whom I share common interests in economics.

More generally, my course is useful preparation for the thesis, and a number of students each year get ideas for their theses from the examples they have seen in my class. For me, advising theses and teaching my undergraduate econometrics course are complementary activities. Many of the examples I use in class come from junior papers and senior theses that students have written for me or for others in the economics department. I let the students know this, and they can see the wide range of interesting topics that are within their reach.

Rebecca Scott stood out in this course, excelling both with the technical material and in the hands-on analyses that are part of the course. When Rebecca asked me to supervise her senior theses research, I was delighted.

In general, the most difficult part of advising a thesis is helping the student define an interesting problem sufficiently narrowly and precisely that it can be answered in an interesting way. Rebecca told me that she had strong interests in public policy related to the environment, and we talked...
at length about potential research problems in this broad area. As with other top students, Rebecca was reading generally and was struck by the federal government’s dismissal of a gasoline tax as an effective mechanism for reducing fuel consumption. The government’s argument, unsupported by direct evidence, was that the demand for gasoline is simply not very price-sensitive. This is ultimately an empirical question, and Rebecca set out to find the answer.

Another difficult problem in advising theses is to convince students that they need to multiply their own estimates of the time needed to carry out the various steps in a good econometric analysis by a factor of at least three. The process (even in my own research) often consists of three steps forward, two steps back. This was no problem with Rebecca. She showed real tenacity and, ultimately, creativity in carrying out her empirical analysis.

Rebecca’s careful empirical analysis used data she compiled on state-level gasoline taxes (not a trivial data exercise), and she found strong support for the idea that tax-induced price changes have a large effect on demand. Along the way, she resolved an important issue with existing literature that had found a smaller effect of price on demand. In the end, she found that tax-induced changes in price (likely permanent) have larger effects on demand than do supply-induced changes in price (likely to be transitory). This is an important distinction with significant implications for public policy, and Rebecca’s work on this is likely to be publishable in a professional economics journal.

Rebecca is continuing her work in economics through graduate study at Cambridge University in England, and I am looking forward to following her career as it develops. This is perhaps the greatest joy of advising senior theses. I see the wide range of careers that my students embark on, and I can often say, with some satisfaction, that I played a role, however small, in helping them realize their analytic capabilities and potential.
For a piece of research so Princeton-focused, my senior thesis was inspired, ironically, by female undergraduates at Yale. In late September of my senior year, the New York Times published a story titled “Women at Elite Colleges Set Path Toward Motherhood.” This claim was based on a Yale survey that found 60 percent of female respondents planned to cut back on work or quit working entirely when they had children. This finding troubled and surprised me. I held a firm belief in my ability and intention to successfully combine an ambitious career and a fulfilling family life in the future. Some of the young women interviewed, however, explicitly stated that being a good mother and successful professional were mutually exclusive, a fact in sharp contrast with my own mother’s example. Underlying much of the discussion, I found the assumption that the tradeoff between career and family was an unavoidable challenge that women, but not men, had to face.

As the blogosphere exploded with reactions to the article and, in particular, criticism of the author’s survey methods, my personal interest in the topic grew. I also knew that Princeton, late to embrace coeducation, had often been at the center of controversial discussions of gender issues. In an ethics course the previous spring, I had read the infamous “Opt-Out Revolution” article written by a Princeton alumna about the career and family choices of a group of female alumnae in Atlanta. Research on attitudes toward this issue at the undergraduate level seemed like a natural extension of an ongoing discussion.

I had come into my senior year, however, with an entirely different thesis topic in mind. I met with several potential advisers for this topic but still could not put aside the idea of investigating my classmates’ plans for career and family. To make a decision, I performed a brief but invaluable test: I described the two competing ideas to my friends. Seniors are told again and again to choose at topic in which they are sincerely interested; I would suggest that you choose a topic in which you can convince other people to be interested. The excitement in my voice when I described this new topic and the interest it sparked in my listeners crystallized my decision. If you are truly passionate about a subject, you can make it relevant to others—and vice versa.

The next step was to find a new adviser. Although I may have seemed a little late in the game, please remember my next piece of advice: do not panic—as long as it is still October. Do not panic if the undergraduate faculty adviser of your department expresses doubt about the feasibility of your research. Do not panic if you are still without an adviser when the deadline for securing one passes. All you need is one person who expresses confidence in the possibility of your thesis and an enthusiasm for your work. My adviser, Professor Nannerl Keohane, and I had never met before the day that I entered her office to sell my new idea for my thesis, and after a series
of rejections from other faculty, her name was the last—and longest—shot on my list of potential advisers. Today, I consider myself privileged to have worked with Professor Keohane. She convinced me, even as I was still persuading her to advise me, that I had a worthwhile topic.

That said, pick an adviser with whom you are comfortable and who can sufficiently devote him or herself to supporting your work. I had far too many friends who dreaded meeting with their advisers. Although I cannot honestly claim not to have been initially a little intimidated about working with such an admired scholar, I genuinely enjoyed my weekly meetings with Professor Keohane and typically left with renewed enthusiasm for the tasks ahead. Thesis writing can be a draining process, and you need an adviser who can read your work with a critical eye while also providing the necessary encouragement. In addition, although Professor Keohane had an extremely busy schedule, she always made time to discuss or edit my work. I know that she seriously considered whether she had that time before agreeing to advise me. She did not have other advisees; doing so probably would have compromised her ability to give my work the attention she felt it deserved. When you need your draft back the next day and your adviser is reading seven other theses, this factor becomes critical.

So I entered Mudd Library over fall break, armed with my new topic and curious to see what other Princetonians had written on the subject. Much to my delight, I came across the thesis of Barbara Zipperman, Class of 1975, who had surveyed her male and female classmates about their career and family plans during their senior year. I developed the idea of resurveying the Class of 1975 to see how their expectations compared with their experiences after graduation, and surveying the Class of 2006, my class, with the same questionnaire to see how attitudes among Princeton seniors had changed in slightly more than 30 years.

This brings me to my next—and most universally applicable—piece of advice: use your resources. Visiting Mudd Library early in the process was one of my best decisions. Even if you do not plan to build off of preexisting research, go to Mudd and see what other Princetonians have written on your topic. Photocopy a few bibliographies and note which faculty members have advised similar theses. Contact the authors of these theses and take advantage of their experience. What questions did they leave unanswered? What are the challenges of exploring this topic? What are the must-read sources? (This proves particularly helpful when there are myriad books on your topic, you have limited time to research, and you want to read the essential pieces of literature.)

Having developed a research plan, my next challenge was to put the two different surveys in the field. Given that both my adviser and I had little experience with sociological research, I was extremely fortunate to
discover the Princeton Survey Research Center. Unfortunately, I think few Princeton students are aware of the center’s existence, but without this resource, my thesis would never have been possible. The center’s staff embraced my project as what seemed to be their top priority, helping me navigate everything from the approval for human subjects research to the recoding of final data sets from their servers. To this day, I am amazed by the time and manpower they unquestioningly devoted to my research, but let it suffice to say that it is a testament to the power of Princeton’s resources.

Analyzing and presenting my data in a way that was accurate, understandable, and conclusive proved to be the most difficult stage of my thesis writing experience. Again I found invaluable resources on Princeton’s campus. Do not be afraid to ask for help when you need it. The remarkably patient staff of the Data and Statistical Services center in Firestone Library taught me, a total Stata novice, how to use the complex software so that I could analyze my data. And just as I thought my head would explode trying to put my findings into words, I knocked—out of the blue—on the door of Barbara Morgan, economist and lecturer in the Woodrow Wilson School. Despite our abrupt introduction, Professor Morgan made the time to serve as a kind of secondary adviser during the most intense, final weeks of the writing process. Her advice was critical in streamlining my statistical analysis and structuring my final regression analysis.

All this is to say, again, that you cannot afford not to take advantage of the vast resources Princeton provides as you write your thesis. In your case, that might mean funding for an international research trip, access to rare historical documents, or interviews with top faculty. My thesis was truly a collaborative effort. This is difficult work; do not feel that the thesis is something to be accomplished alone.

I am most indebted, however, to my adviser, Professor Keohane. Her expertise in the area of feminist thought and willingness to share personal experience brought greater sensitivity and sophistication to my work. Her critical eye demanded more precise prose; my thesis is much stronger because I was forced to be more careful about my use of certain terminology and more concise with my conclusions. Moreover, I also greatly benefited from the exposure that she gave to my work in elite circles of Princeton faculty and alumni.

I am also grateful for the support that I received from the author of the original thesis, Barbara Zipperman, who gladly brushed the dust off her thesis and shared her personal experience with me. The ability to share the thesis experience with a Princetonian from a previous generation is why the Princeton thesis experience is so truly unique. Barbara was instrumental in helping me to communicate with her graduating class, and I am indebted to all of the members of the Class of 1975 who participated in my survey. My contact with Princeton alumni and the genuine interest they expressed in my research were two of the most rewarding aspects of my thesis experience. If at all possible, use your thesis as a means to
connect with the broader Princeton community. The opportunity to come down from the ivory tower and discuss the issue of work-family balance with so many accomplished men and women was invaluable; those conversations brought a greater sense of realism to my work and reinforced the importance of my topic. The attention that my work received from the on-campus community, alumni groups, and alumni publications made the hard work all the more worthwhile.

The conversations I shared with my peers about this topic, however, are the aspect of the thesis experience that had the greatest impact on me. I approached this topic with very strong personal opinions, believing I knew the “right answer” to conflicts between career and family life. My thesis experience made me more sensitive to the diversity of solutions that men and women employ to resolve issues of work-family balance. Friends whom I greatly respect plan to approach this issue quite differently from me. I gained a greater appreciation for the way that my peers plan to order their future priorities, and have been forced to reconsider my own biases and plans as well.

In the end, aim to create a thesis that contributes to the continuing exploration of your topic. I am proud to say that my thesis research has contributed to an ongoing dialogue about issues of work-family balance. Although certainly far from perfect, it offers some statistical evidence with which to evaluate trends as they are reported in the popular press and provides an idea of the ways in which the next generation of college graduates plans to balance career and family. A Princeton alumna who teaches at a college on the West Coast is continuing my study, and my findings were referenced in an academic journal on higher education. I still talk—and enjoy talking—about my thesis with friends, family, colleagues, and scholars. My thesis taught me that there are no perfect solutions to the challenge of work-family balance, but open and informed dialogue about the current state of affairs is critical to giving people the choices they desire.

Nannerl O. Keohane

Laurance S. Rockefeller Distinguished Visiting Professor of Public Affairs and the University Center for Human Values

Advising senior theses is one of the distinctive components of being a faculty member at Princeton, just as writing a thesis is a distinctive part of being a Princeton senior. The best parts about the experience from a faculty member’s point of view are working with a student to bring focus to an initially vague puzzle or area of broad interest and then, over the months of the senior year, helping the student give substance to that inquiry.

In some cases, this means advising about method; in others, about content; in every case, about procedure. One of our key roles is making sure students recognize that even though a year sounds like a long time, a thesis takes steady
and intensive work from the beginning of the senior year (or even before). You can’t write a good thesis if you see it as a “last minute” or “all-nighter” type of assignment. It’s not primarily a matter of what grade you get; it’s whether you have the chance to benefit from what is truly one of the best things about a Princeton education. Writing a serious research paper, from start to finish, is a significant, challenging, and rewarding accomplishment, and one of our goals as advisers is to encourage students to approach the task in this spirit.

Compared with other kinds of teaching, the rewards of thesis advising include sustained engagement with a particular project, and getting to know a talented Princeton senior very well. In advising Amy Sennett, I enjoyed learning something about life at Princeton outside the classroom or the faculty member’s office, and coming to know her as a fascinating young woman. We met regularly in my office from the beginning of the year, discussing the steps she needed to take at each stage of the work. I encouraged her through the last intensive writing stage, participated in her oral exam, and then relished watching her and other Woodrow Wilson seniors celebrate in the fountain after turning in their theses in April. At Commencement, I had coffee with Amy and her family, and we have corresponded occasionally by e-mail during her post-graduation year as part of Princeton in Asia. Although I came to know a few other students fairly well in my undergraduate seminar, I know Amy much better because of the thesis, and this is something I truly treasure.

Because Amy’s thesis was on such a timely topic—career choices for women and men, juggling family and work—and because she was already interested in writing and journalism, she was invited to write about her thesis for several publications, including the *Princeton Alumni Weekly*. It was rewarding for me to support her through this post-thesis opportunity, and I recommended her as a speaker for several alumni groups who were eager to hear about her findings both in terms of current students and alumni.

I became a Princeton professor in September 2005, so Amy was my first thesis advisee. One thing that amazed and delighted me was discovering how much support and help Princeton provides for seniors during this process. I was a bit diffident about advising Amy at the outset, because it was clear that her thesis would be strongest if it involved some serious survey research, and this is not an area I know much about. I was able to help her gather data about women, work, and family, and to frame the questions from a theoretical perspective, but sophisticated survey design was *terra incognita* for both Amy and me.

How pleased and impressed we were to learn that there are staff members here at the Woodrow Wilson School whose jobs include giving advice to seniors about technical aspects of their thesis writing. I know Amy found
this very useful, and I surely did as well. The thesis would be a much less valuable piece of work without the survey, and quite a few people at Princeton, across the University, helped her design and implement that part of her thesis. This kind of support for undergraduate work is not a typical feature of most universities, even very fine ones, and Princeton students are very fortunate to have it available. I would encourage any thesis writer to make sure to explore such opportunities and take full advantage of them.

Amy chose a topic that generated a great deal of interest among many readers. She contributed to the ongoing discussion of the “opt-out revolution” and shed valuable light on the assumptions and ambitions of her generation of college men and women. This meant that her thesis got more attention than the typical senior thesis, and both Amy and I found this rewarding. But it was not the essential part of the experience. For me, the most important part of the project was working with Amy as she refined her expectations about questions she would ask and clarified the ways in which her findings could fit together into a larger whole. It was rewarding to watch her deepen her understanding of the challenges women and men face in combining career and family, expand her familiarity with some of the scholarly ideas that provided the context for her survey and helped her interpret the results, and gain a fuller confidence about her ability to communicate her findings to others.

Whatever career path Amy chooses in the long run, this is an exceptionally valuable set of skills, and in the years ahead, I am sure that she will often have reason to be glad that she took this project seriously and enjoyed bringing it to completion. For me, advising Amy’s thesis set a high standard for the whole experience. I’m glad to have had the opportunity to work with her.
After returning from my junior year abroad at Oxford University, I learned that my junior independent work had been recognized as my senior thesis at Princeton. As any student would be, I was overjoyed at the sudden academic freedom that this offered me; no longer required to take up a research project during my senior year, I was now able to enroll in a number of classes in the humanities that I had always wanted to take, in subjects such as history, photography, and creative writing. But believe it or not, after giving it a considerable amount of thought, I decided to start a second senior thesis anyway. You must be thinking that I was utterly and absolutely insane for making this decision; indeed, my friends responded almost unanimously with variations on the phrase "you're crazy" when I first told them.

So why did I choose to write another thesis? While at Oxford, I discovered that there was something about independent research that sparked my enthusiasm in such a way that it didn't make it feel like work at all. For me, the experience of writing a thesis wasn't at all about staring at a scary minimum page requirement, or planning, writing, and editing an endless series of thesis chapters, but about playing around with simple ideas and the computer programs that would visualize them for me. Hence, even though the choice was far from obvious, choosing a second thesis, for me, was choosing more freedom and variety in my daily schedule rather than less.

Doing research in the field of engineering also filled me with a sense of relevancy and usefulness that I had never experienced before in any of my classes. While at the Department of Engineering Science at Oxford, I became interested in the field of bioengineering through an independent project on the biological response of human skin tissue to burn injuries. The project was part of a larger, ongoing research project conducted at the Stoke Mandeville Hospital in Aylesbury, U.K. In this study, investigators were using oligonucleotide microarray analyses to compare the differing gene expressions in cooled vs. non-cooled burn wounds, with the intent of identifying those gene agents that accelerate or decelerate the healing process of thermal lesions. In other words, they were trying to figure out what it is about sticking your hand under cold water after a burn that makes it so beneficial. I was thrilled to participate in this project, as it represented a pioneering step toward the development of new drugs or therapies to treat burn wounds and to reduce tissue scarring. My contribution to the project was to develop a heat transfer model to simulate the damage in human skin tissue caused by different burn scenarios, and to use this information to assess the thermal efficiency of post-burn cooling therapy.

After returning to Princeton, I wanted to work on a project of similar clinical relevance—one that had potential for making a positive difference to people's lives. For my senior thesis, I approached Professor Alexander Smits and Dr. Gary Kunkel of the Department of Mechanical and Aerospace Engineering...
Engineering to work on the mechanical and optical modeling of the lens in the human eye. This project was again part of a larger research effort, this time toward the creation of a new procedure in laser eye surgery for the permanent correction of a common condition known as presbyopia.

Age-induced farsightedness, or presbyopia, is the gradual decline in the eye’s ability to focus, or “accommodate,” on nearby objects. The decline in focusing power occurs throughout life, but becomes noticeable around age 40, when the nearest focusing distance recedes past the average reading distance and creates a need for reading glasses. The main idea behind the new procedure was to reshape the human lens using laser surgery in order to restore its ability to focus on a wide range of distances. (LASIK uses similar laser techniques to perform vision correction, but reshapes the cornea, the transparent sheath across the front of the eye, instead of the lens.) To gain an understanding of the effects of this reshaping on the mechanical and optical behavior of the lens, I implemented a finite element model of the lens as well as a ray-tracing algorithm to calculate the path of light rays passing through it. I was very excited to be working on this project, as it allowed me to play an important role in the quantitative analysis of some of the driving ideas behind the larger project, while at the same time providing me with an opportunity to learn about the powerful technique of finite element analysis, and gain valuable programming experience in MATLAB.

Admittedly, the process of implementing my algorithms and writing everything up in the form of thesis chapters wasn’t always fun and games. One of the most frustrating parts of my thesis, for instance, was detecting bugs in my code and paying attention to the minute but important details of my finite element model of the lens. It took an excruciating amount of time and patience to get everything to work, and I painfully experienced the truth in the saying “the devil is in the details.” In the end, however, I was rewarded by the feeling of having investigated something in depth independently, and of having had the intellectual freedom to explore the topic in the way I wanted.

An additional reward that came with the experience of writing my thesis was that I obtained a number of publishable results. I am finalizing my draft for publication only now, six months after graduation, but pulling together my most important results into a single publication really makes me feel that I have made a measurable contribution to the body of knowledge concerning laser reshaping of the eye lens. More specifically, I demonstrated, using an accurate finite element model of the lens, the feasibility of reshaping the ageing lens in the human eye to the geometry of a younger one in order to restore its capacity for accommodation. Of course, there are still numerous challenges to surmount before such a clinical procedure would become commonplace, but my contribution of demonstrating the feasibility and
While the process of writing my thesis was certainly not an easy one, it was definitely a challenging one that confirmed my previous conception of the enjoyable sides of research. . .

Equally importantly, my thesis work at Oxford and Princeton has awakened my interest in working on medical applications of engineering science in graduate school. I am now reading for a doctoral degree in medical image analysis at Oxford, where I am working on the early detection of breast cancer using the imaging modalities of magnetic resonance and tomosynthesis. My junior and senior independent projects have been truly formative to my belief that medical applications provide a humanitarian focus within the engineering discipline; every innovative diagnostic or curative technique has the potential to improve or, in some cases, even to save lives.

My advice to future thesis writers would be to remember that your thesis (or the path toward it, for that matter) will never be perfect. In fact, in the process of writing my publication, I am amazed to discover how many additional research questions I could have pursued, but never did, and embarrassed to see how many trivialities caused me confusion while writing up my thesis report. For example, I remember going through a lot of trouble figuring out what the correct form of one of the most basic equations in my thesis was. I had started looking for it in the literature, but just didn’t think of the fact that different authors could be using different conventions for the signs of the variables involved. Not realizing this right away led me to a point where I was staring at five introductory textbooks sharing three different versions of the same equation among them, each different by what I erroneously thought to be a +/- sign “error” somewhere. It all sounds pretty obvious now, but hey . . . just don’t let it happen to you!

Also, leave enough time to format your thesis properly. I finished writing up my thesis about a week before the deadline, but then put off the task of actually making sure that my section titles were all in the right fonts, references were all in place, etc. As a result, I ended up spending all night before the deadline referencing my figures, tweaking my introduction and conclusion, etc. It completely caught me by surprise how much time I really needed for the final touches. I only had my thesis bound the day of submission, so it was a matter of luck that I finished in time what I really should have finished an entire week before.

Lastly, once it’s all done, just go and hand it in! In the hours before the submission deadline, when I had my thesis all bound and pretty, I had trouble parting with it! My roommate found me sitting on the couch in my room just admiring it, still spacey on the coffee beans and Coca-Cola kindly provided by my roommate the night before. I found myself totally in love with it and unable to part with my precious little baby. Fortunately, my roommate told me to stop flirting with disaster and provided me with the proverbial kick in the pants to go turn it in.
Having said that, perhaps the most useful thing I could say is the following: don’t be intimidated by the thesis stories published in this booklet. They’ve all been written post factum and naturally come across as far more straightforward than they really were. My advice would be to not get too hung up on these, and to not regard them as examples to be followed—just work on your project trusting your own instincts. In other words, a fair amount of irreverence would not be undue!

While the process of writing my thesis was certainly not an easy one, it was definitely a challenging one that confirmed my previous conception of the enjoyable sides of research, and one that stimulated me to pursue a graduate degree in a medically relevant area of engineering.

Alexander J. Smits
Professor of Mechanical and Aerospace Engineering

One of my greatest pleasures in teaching at Princeton is advising students on their thesis and independent work projects. It allows me to really get to know a student, and gives me the chance to help explore an ever-changing array of topics that I might never have considered if it were not for students coming into my office and telling me about their particular interests. From one year to the next, the topics can range from studying the interaction of airplane wakes with the ground, or turbulent flows in a wind tunnel, or working on the design of a water “windmill” to generate power in an ocean current. Recently, I have developed interest in applying engineering to problems in biology and medicine, and this has proven to be a very fertile and exciting source of thesis topics.

One set of projects focused on developing a better understanding of the mechanics of swimming, and has led to the construction and testing of a robotic eel, manta ray, and dolphin. Professor Michael Littman has often been a co-adviser on these projects. The first robotic eel was designed and constructed by Annora Bell ’05 and Ed Shelton ’05, and it has now gone through various iterations to become a principal component in a joint research project with the University of Maryland, funded by the National Institutes of Health, that is trying to understand how lampreys swim. Our piece is concerned with the fluid response to swimming motions, and how that fluid motion can feed back to the lamprey for control of its swimming and maneuvering activities. The robotic manta ray project with Rick Clark ’04 GS ’05 investigated how undulations of the manta ray pectoral fins are used by manta rays to swim and maneuver. Rick’s project eventually developed from a senior thesis into a materials science and engineering project, and has led to several publications including one in the prestigious Journal of Fluid Mechanics.

Senior Lilly Fang ’07 and I are now studying dolphin swimming. Dolphins swim very fast, and undulate the rear half of their body up and down, forcing their tail surface, or fluke, to generate great thrust. Lilly is constructing a robotic dolphin,
and we hope to make it as realistic as possible. She is using a full CAT scan of an actual dolphin, as provided by the Woods Hole Oceanographic Institution, to build her robot, and when it is ready to go in our water channel she intends to examine thrust production as a function of tail beat amplitude and frequency, and to study the flow in the wake. Seeing a design take shape and become an actual piece of laboratory hardware, and then using it to generate new knowledge, is a very exciting process, one shared by student and adviser alike. Not to mention the cool-looking videos and flow visualization movies we can make.

Another set of projects concentrated on new applications of lasers to eye surgery. These projects have principally been conducted in conjunction with Professor Szymon Suckewer, who is an expert in laser physics. We’ve also been very lucky to have a leading eye surgeon, Professor Peter Hersh of the University of Medicine and Dentistry of New Jersey, on our team, and he first suggested using laser surgery to correct for presbyopia, which is the age-related loss of focusing power of the human lens. The reduced focusing power is called "loss of accommodation," and it happens naturally as the lens ages. There is currently no procedure, surgical or otherwise, to correct for presbyopia, and so we all end up wearing glasses as we get older.

Hersh indicated that there were two parts to this problem. The first was that the causes of presbyopia were not well understood. The main candidates for an explanation were (i) because the lens material becomes stiffer with age, the muscle that changes the focus of the lens (the ciliary muscle) is no longer strong enough to deform the lens, or (ii) because the lens continues to grow throughout a person’s lifetime, the points of attachment of the muscle change their relative location and therefore become less effective in deforming the lens. The second part of the problem was to see if lasers could be used in a new surgical procedure that would restore the lens’s accommodation.

To answer these questions, Gowri Rao ’05 in her senior thesis developed a computer model that included the mechanical and optical aspects of the lens. She worked closely with Gary Kunkel, a Council on Science and Technology postdoctoral fellow. In this model, she used a finite-element program to calculate the deformation of the lens when acted on by the ciliary muscle, and an approximation to the lens shape to calculate its focusing power. She was able to show that more than 75 percent of the loss of accommodation was due to the increased size of the lens, rather than the change in its mechanical and refractive properties.

Last year, Dominique Van de Sompel ’06 took up where Gowri left off, and, still working with Gary Kunkel, built a more sophisticated model that incorporated many more details of the lens biology, including the capsule that holds the lens in place and the attachments that connect the ciliary

Seeing a design take shape and become an actual piece of laboratory hardware, and then using it to generate new knowledge, is a very exciting process...
muscle to the capsule. He also improved the modeling of the lens optical properties, incorporating the observed gradients of refractive index, and adding a detailed ray-tracing model to more accurately calculate the focusing power of the lens. This was a superb effort that was written up in a paper that is currently under consideration by the *Journal of Vision Research*. The important implication of his work is that if we can reshape an older person’s lens, a significant recovery of accommodation can be achieved. Professor Suckewer is now exploring new ways to use laser tissue ablation to reshape the lens, thereby opening the way for a new surgical procedure to correct presbyopia, in a manner similar to the way LASIK surgery is used to correct the cornea for nearsightedness. I look forward to working with many more students as we explore these new possibilities.
On the first day of spring break about a month and a half before my thesis was due, I discovered that my microscope had been stolen from my lab. This microscope was perhaps my single most important data-collecting tool besides my eyes. And it wasn’t even my microscope. Earlier that year, I had enlisted the help of our undergraduate administrator to track down a specialized microscope suitable for studying protein crystals, and Professor Clarence Schutt, who had another microscope stolen from him previously, was generous enough to loan me his remaining microscope. Furthermore, I had zero pages written. Spring break was going to be the last major push to get results so I could have something to write about, but I couldn’t collect any data without this microscope.

Seniors working in the experimental sciences spend the majority of their time doing experiments to get data significant enough to merit a thesis. While my non-experimentalist friends were churning out pages daily, I spent my days and nights in lab running experiments in a big walk-in refrigerator, dispensing microdroplets onto small glass squares to grow crystals of designed proteins. It was an awesome project, and I still would have chosen an experimental thesis over any library thesis because I particularly enjoy working with my hands and seeing results materialize before my eyes. Besides, our windowed lab beat the B floor of Firestone Library. But the reality was that at the end of the day, Princeton wanted a written document, and my friends could have bound 60 pages of bad literary analysis if they absolutely had to, while I’d have only my lab notebook of inconclusive results to be fitted with a new gold-stamped, overpriced cover. Fortunately, departments understand this predicament, so experimentalists generally have a later deadline. But no later deadline was going to bring my microscope back.

Two days after the theft, I sat in the house of a staff member of Princeton Evangelical Fellowship, which I was involved in, lamenting my ruined plans for spring break and squashed hopes for my thesis. I realized I couldn’t control everything, an especially hard lesson for any Princetonian who came from high school thinking that effort and planning guaranteed good outcomes. The lab filed a police report, and I investigated microscope alternatives, but nothing seemed viable. Then the staff member called a friend to help me find a replacement microscope and prayed that God would "compel [the thieves] to return the microscope." I honestly thought it was a lost cause since the other microscope stolen a few years ago had never been found. But two days after that meeting, Professor Michael Hecht sent me an e-mail announcing that Department of Public Safety had recovered my microscope! In the middle of the night, public safety caught some teens stealing other items, and my microscope was in the trunk of their car.

After it was returned a month before the due date, I had a newfound appreciation for my microscope and wasted no time in finishing experiments and shooting pictures of the crystals through the lenses. With a lot
of support, I spent the last whirlwind weeks writing, importing images, and coaxing Microsoft Word to be nicer to me. On the due date, a friend drove me to the printer shop to drop off my order. After several hours, the technician called to say their printer had broken. So we sped off to the next town to get it printed in time. Despite all the drama, I handed in all my copies with time to spare, went to class that evening, and was thrilled a month later to find that my thesis was extremely well received by the department.

This slice of my thesis experience encompasses many of the larger life lessons I learned from writing the thesis. The academic benefit obviously includes the independent research and writing experience, but the personal lessons are more subtle. Foremost, the thesis is unabashedly hard—but it is manageable, even pleasant, when done in a community. I had a great thesis experience mostly because my advisers were amazing. Professor Hecht and Dr. Luke Bradley from the chemistry department, and Dr. Philip Jeffrey from the molecular biology department, among many others, were essential to my project. They patiently taught me and challenged me to think about new ideas, read multiple drafts, and were extremely thoughtful about how best to help me succeed. On the non-academic front, encouraging friends who supplied moral support, did my laundry, brought me food, and extended formatting assistance were integral in helping me survive thesis life. Even public safety played a role in producing my thesis, as did the Office of the Dean of the College through which I received funding. The thesis—especially in the experimental sciences—is by nature an academically and socially collaborative effort such that no one can do it well in isolation, and I am so grateful to everyone who stood with me.

Along with learning that I can’t control everything, I also realized that I should not put my identity in my thesis. Every senior struggles with this and experiences some degree of paralyzing fear about the implications of the thesis’s importance. The quality of your thesis is unrelated to your worth as a person. Are you not worth more than a 100-page paper? Experiments sometimes just don’t work, microscopes get stolen, printers break down, and you have to turn in your best effort instead of your best work. Remember to keep this problem of privilege in perspective. You’re at Princeton, and you get to work with a world-class professor on your own project. Furthermore, remember that the thesis months are the last few months of college where you live with your best friends. Work hard, but don’t alienate your friends or severely impair your livelihood for the sake of producing a stellar thesis. Unlike friends, even the best thesis cannot save your life, but it can drain life from you.

Overall, I appreciated the thesis requirement despite the rough times, most of which I’ve conveniently forgotten. More than just an academic exercise, it was truly a priceless life experience. I enjoyed studying a topic in greater depth, and this has made me feel more prepared and inspired to do

Staying on one project was valuable because it allowed me time to grow.
graduate work. I was also fortunate to be able to see the evolution of a project over three years, since I started research during my freshman summer on what ended up as the first chapter of my thesis. Staying on one project was valuable because it allowed me time to grow, become more independent and invested, and apply my own ideas and direction under the wise guidance of my adviser. Over three years, Professor Hecht and Dr. Bradley also became mentors, caringly encouraging me not only about the project at hand, but also about my career in science and life plans. Though seniors often grumble about the labor pains of writing the thesis, we are ultimately thankful for the opportunity to accomplish such a large work with renowned scholars. The thesis requirement is truly one of the best parts of the curriculum, making Princeton unparalleled in undergraduate education.

Michael H. Hecht  
Professor of Chemistry

One of my first memories of Princeton was a visit to campus shortly after I had been offered a position as an assistant professor of chemistry. I spent the day meeting the faculty one-on-one in their offices. In each office I asked two questions: What is the best thing about your job at Princeton? And what is the worst? I don’t remember how they answered the second question (since they were recruiting, they didn’t say anything negative and memorable). However, I vividly remember how several of them described the best part of their job at Princeton. One professor after another said the part of the job that he or she most enjoyed was the opportunity to work with Princeton undergraduates and to guide these students through their first experiences with research. In the years since those interviews, I have discovered time and again how much I agree with those initial statements: Mentoring undergraduate researchers like Anna Wang is indeed one of the most enjoyable parts of being a professor at Princeton.

Undergraduate students at other colleges and universities occasionally do research. At Princeton it is not an “occasional” thing—everybody does research. While the intense focus on undergraduate research may cause some applicants to shy away from Princeton, it is also one of the main reasons that some of the most talented college students in the world decline their other options and choose to come to Princeton.

Princeton endeavors to be two very different kinds of institutions. On one hand, Princeton tries (and succeeds) to be among the top research universities in the world. On the other hand, Princeton tries (and succeeds) to be a small and intimate undergraduate college where students can get to know their professors in a supportive and interactive environment. What makes Princeton so unusual is that these two goals are not pursued separately; they are combined into one goal. This is accomplished by including all college students into the research goals of the University.
Why is this important? Why is research so different from taking classes?

I’ve heard it said that the major difference between research and classes is that in research the professor doesn’t already know the answer before he or she asks the question. When students and faculty work together on a research problem, they can discover something novel that neither of them knew beforehand.

Courses are where students absorb pre-existing knowledge; research is the opportunity to create new knowledge. At most universities, undergraduate students study pre-existing knowledge, while the excitement of creating new knowledge is reserved for graduate students, postdoctoral researchers, and faculty. At Princeton, undergraduate students—through their senior thesis research—participate in this creative process.

Pursuing research in the experimental sciences can be particularly exciting. Not only does one have an opportunity to extend our fundamental understanding of the universe around us, but the daily activity of the research is also an extremely collaborative and socially interactive process. This may be surprising to non-scientists whose image of a typical scientist is a loner in a white lab coat working long hours in an obscure laboratory far away from other people. Nothing could be further from the truth. Modern scientific research is rarely done by individuals working in isolation. Open any scientific journal and you will find that almost all the articles have multiple authors. In my own research at Princeton, every one of my projects has been a collaborative undertaking with contributions from scientists with a range of experience and expertise. It is not unusual in our research for professors, graduate students, senior thesis students, and even precocious sophomores and juniors to come together from the departments of chemistry, chemical engineering, and molecular biology to bring a project to fruition. We design the experiments together, we discuss their progress at weekly (sometimes daily) meetings, and when the experiments are done, we write the papers as coauthors. As a chemist, I am intrigued by how molecules interact; as a teacher and mentor I am fascinated by the ways in which scientists of all ages and disciplines collaborate and interact.

Guiding Anna through her undergraduate research exemplified many of the issues I described above. Anna studied novel proteins that had been designed “from scratch” by her collaborators in my research group. Her research on protein design helped lay the foundations for future advances that may ultimately lead to novel proteins that are tailor-made for specific functions in biotechnology and medicine. Anna’s project was highly interdisciplinary. While the concepts of molecular design were drawn from chemistry, the day-to-day laboratory experiments relied on a range of approaches drawn from molecular biology and chemical engineering. Indeed, Anna’s collaborators—and the coauthors of the article she published last year—included chemists, a biochemist, and a chemical engineer.
Anna was a precocious undergraduate researcher who started working in my laboratory during the summer after her freshman year. Several of her experiments from that first summer not only found their way into her senior thesis, but also appeared as part of a publication in a journal on protein design. Because Anna got such an early start, her undergraduate research experience was not limited to her senior year; we collaborated on projects for three full years. After she graduated, others in the lab continued working on her projects. Today, researchers in my lab are still working on the “WA” (Anna’s initials) series of protein molecules.

Anna’s undergraduate research exemplified the interactive nature of modern science. She worked closely with several people, ranging from an advanced postdoctoral fellow to another undergraduate thesis student. Anna and I spoke regularly, and I recall numerous sessions when we sat in my office for well over an hour discussing topics that ranged from the smallest details of her experiments to the big picture issues about life as a research scientist and the position of women in academia.

Anna Wang was the 37th undergraduate student to do her senior thesis research in my lab. Along with her 36 predecessors, Anna reaffirmed what I heard on my first day at Princeton: guiding Princeton undergraduates through their initial experiences with research is indeed one of the best parts of being a professor at Princeton.
It’s one of the happy things about our brains that things almost always seem better in retrospect. Even a few months go by, and the tears, stomachaches, nightmares, and panic attacks dissolve into a vague memory, becoming experiences that seem to have been lived by someone else. Senior year vanishes, and you’re left clutching a thin volume (it’s always thinner than you think it’s going to be, and thinner than you think it should be), with only the foggiest notion of how this hardbound...thing has found its way into your arms. But, like a child conceived in a drunken haze, you love it anyway, and the story of its origins becomes all the more mythical for the unexpectedly wonderful way in which things have worked out—the tale of an epic, victorious battle told from the safe, familiar vantage point of a warm fireside in a little cottage in the English countryside.

Getting rid of paragraphs like the one above was one of my aims working on my thesis. Academic writing in the humanities ties style intricately, even inextricably, to content. If your metaphors are leaden, in other words, so are your ideas. I viewed my thesis, and was encouraged to do so, as a writing exercise as much as anything else. Oh, to return to the moral of my story about conceiving children: Do not worry if you are often sad during the writing of your thesis. It is normal. It will pass. You will love your child so much that you will not remember the nine months of morning sickness. My metaphor has changed slightly, but remains entirely true.

I first read the poetry of Stéphane Mallarmé during my junior year, in Professor Suzanne Nash’s seminar on modern French poetry. Most of what I remember about that first encounter is that I had no idea what was going on. (I still have little-to-no idea what is going on.) I once heard that Mallarmé is easier for foreign French readers to understand than for natives—they read him like he “should” be read, word by word—and I guess that might be true. But, basically, he’s hard for everyone. He is notoriously hard, one of the most confusing poets ever. I learned a bit, though not much, more when I decided to write my spring junior paper partially about Mallarmé. I was interested in the visuality of poetry, the ways in which how a poem looks affects our reading of it. Mallarmé was intensely interested in the way things look, and he experimented throughout his career—as I tried to show—with the relationship between an image and a text, experiments which became more and more radical. Late in his career, he published a poem called “Un coup de dés,” in which words were strewn down the page like the thrown dice of the title. Twentieth-century literature has taken this poem as a major inspiration, notably by the surrealists, who were early and loud advocates for Mallarmé’s place in the canon. So in my junior paper I studied André Breton, one of the founders of surrealism, and how his experiments with text and image were influenced—and, as it turned out, not influenced—by Mallarmé’s. In the end, I concluded that the crazy, sexy, radical surrealist Breton was in many ways much more aesthetically conservative about this text/image stuff than
the long-dead, stuffy, esoteric schoolteacher Mallarmé. This conclusion was a bit of a surprise. It made me like Mallarmé a lot, and I had fun working on him, even though I still didn’t really understand much of it.

Since I did have fun doing this junior paper, I naturally thought about working some more on Mallarmé for my thesis, especially since the ideas about visuality and poetry were still on my mind, too. It is a nice idea, to connect your junior and senior independent work. Not to do exactly the same thing, of course, but something related. It perpetuates the pleasant idea that there are continuities in life. I’d even recommend, at the beginning of senior year, not only meeting with your thesis adviser, but with your JP adviser, too; he or she can recommend ways of taking your established interests in new and frightening directions, and already has a sense of your work. So, thinking I would write about Mallarmé, I read even more books and articles about him. Now, Mallarmé criticism is a funny field. There has been a lot of bad writing about Mallarmé, and very little good or useful writing. It struck me that most of the scholars working on Mallarmé understood him very little, so they were unoriginal, or repetitive, or petty, or wrong. This was a weird realization, that I could think that scholars were wrong, but it is a very helpful realization at the beginning of the thesis process. It made me feel both humble, because of how likely it was that my work too would be undistinguished, and hopeful, because I thought that if I could identify work I didn’t like as sub-par, I could perhaps do a tiny bit better.

In a few of the articles, a fashion journal was mentioned. It seemed as though Mallarmé had, under various pseudonyms, written and designed eight issues of a fashion magazine, a kind of homemade *Vogue*—just as gossipy and status conscious. It is extremely hard, when you consider the abstract, intellectual, philosophical Mallarmé, to imagine him as Anna Wintour. A good many critics (though not so many; it is just relatively recently that much attention at all has been paid to Mallarmé and fashion) are a bit flummoxed by this. So I made it my thesis topic to write about what this journal had to do with the rest of Mallarmé’s output, especially with the poetry. Was it his interest in people versus things? His obsession with the body? During conversations with my adviser, though, I began to question this approach. The problem with past criticism of Mallarmé’s fashion writings, I thought, was that they were too focused on “issues of the body” or “19th-century commercialization” or other critical terms which seemed to me a little bit vague and stale. He suggested that I focus more on fashion itself, as a philosophical and aesthetic category. Rather than writing about Mallarmé, in other words, I should try to see Mallarmé as one of many examples of how fashion was used more generally in 19th-century French culture. This leads to yet another moral: Be as specific as possible when coming up with a topic. I mean, write your thesis, at least in theory, about one poet, or even one poem. Since your scope will inevitably widen, starting out with the most focused topic possible will keep even your eventual questions manageable.
As I went on, I found that my Mallarmé thesis was becoming, increasingly, a thing of the past. Literally: to write about what fashion meant in Mallarmé’s time (toward the end of the 19th century), it became necessary to keep on going back in time, excavating the way in which clothes were figured in both written and visual culture stretching back to the time of the Revolution. Mallarmé, in the end, came to claim about three pages at the end of my conclusion, an outcome I would never have predicted at the outset. At some point, you’ll need to recognize that this could go on forever, foregrounding and foregrounding, but it is O.K.—in fact, it’s great—to let your story take its own direction. And you really should think of it as a narrative; the first sentence of my thesis that occurred to me was the first sentence of the introduction, “This is a story about unwearable clothes,” and it was incredibly helpful to think this way, like I had a main character (in this case, Fashion) whose story I was telling through time. I’m convinced that it makes your prose better, too, to write this critical paper by thinking of it as a novel. (However, this should not, to say the least, make you lax about citing sources.) To watch this character make its way through different surroundings—one of my chapters was about a nonfiction treatise, another about caricature, a third about poetry—was, to me at least, actually interesting, and thinking narratively like this makes it more interesting to your adviser, too.

Of course, it is not all fun and games and writing stories. There is research to be done; there are tears to be shed. Potential pitfalls abound.

Daniel Heller-Roazen
Professor of Comparative Literature

When carefully planned, researched, and executed, a senior thesis can be an outstanding piece of undergraduate work, quite unlike any other that a student has the chance to compose. For a faculty member, advising a senior thesis project can therefore be an exciting process. One never knows exactly how the project will end until the thesis is submitted, but one can nevertheless infer a number of things from a student’s progress during the year.
In literary fields, it is above all important for the student to begin thinking as soon as possible about the textual object on which the thesis will bear. To be sure, a good thesis addresses questions that could be investigated with respect to a vast, perhaps even unlimited number of texts; and, more often than not, it draws its critical tools from studies on various authors, who may not be those discussed in detail in the thesis itself. But for the senior thesis to succeed, it must clearly define its own object: which works it will seek to illuminate and, if possible, which dimensions or aspects of the works to which it will pay the most attention.

This can be one of the most difficult parts of conceiving a thesis project. It may seem a merely preparatory activity, but it is not. The effort a student expends rendering the textual object of the thesis as precise as possible is part and parcel of the thesis-writing activity itself. This is why it can be a good reason not to rush this process, which will most likely still be under way even when the student begins writing. The more exactly a thesis succeeds in defining its objects, the more powerful its critical arguments will be.

In the literary disciplines, it is equally important for a student to have a clear sense of which aspects of the works the thesis will seek to clarify. Which problems, which ambiguities, which paradoxes stand in need of explanation and study, and why? This question is often best addressed in the same period in which a student defines the works on which the thesis will bear. Ideally, a thesis will bear on a selected number of works in which a single question—or set of questions—can be clearly identified.

One of the real virtues of Zachary Woolfe's thesis was that it succeeded as very few theses do in defining both its textual objects and the theoretical problems it sought to address. A thesis on the problem of the commodity-fetish in 19th-century France could have addressed innumerable works of literature and art in a great number of terms. But “Century of Death” took as its object something at once more original and more precise. Despite the range of theoretical and critical questions it raised, “Century of Death” was a remarkably concentrated work, which brought formidable skills of close textual and iconographical analysis to bear on a judiciously selected set of important works.

Each of the three chapters of the thesis bore on a particular corpus, identified by a lapidary name and date: respectively “Balzac, 1830”; “Granville, 1843”; and “Baudelaire, 1857”. This economical distribution of works assured an admirable generic diversity among the objects examined by the thesis. Chapter One took as its focus the didactic manual as invoked, ironized, and transformed by Balzac; Chapter Two concentrated on caricature and its interlacing of text and image in Granville; and Chapter Three, perhaps the most ambitious in the thesis, constituted the natural culmination of the study, concentrating on Baudelaire’s works of literary and art criticism, as well as his poetry in verse and prose.
This division was in a sense quite simple. But one should make no mistake: nothing in the thesis writing process is harder than reaching such simplicity of analysis, by which a minimal and judiciously selected corpus of works forms the nucleus of a single extended inquiry. It was many months before Zack decided on this form, and that is very much as it should have been. Through months of weekly meetings, the shape of the thesis emerged. Many other authors could have been discussed, and one might have imagined many other chapters. But the strength of this thesis—like that of all good critical works—lay in its economy, which allowed it to concentrate, with impressive results, on a small set of decisive works in the history of art and literature.
I was a precocious “almost-freshman” when I first set foot on the fourth floor of Moffett Labs. It was early July before my freshman year, and I had contacted Professor Eric Wieschaus with the hope of being able to do research with *Drosophila melanogaster*—fruit flies. I was nervous but quite determined to earn myself a spot in the lab. I was all too aware of the academic and intellectual chasm that existed between Professor Wieschaus and me. My credentials included two high school biology classes, a high school diploma, and two summers’ worth of experience in the lab of Professor Ruth Steward at Rutgers University where I changed fly food, made buffer solutions, and attempted *in situ* hybridizations. I remember wondering how I was going to hold up my end of a conversation with a Nobel laureate and Howard Hughes Medical Institute investigator. I left his office completely surprised by both his down-to-earthness and his willingness to take a chance on me. I started within a week and remained a member of the Wieschaus lab for all four years of my Princeton career.

Conducting research is no easy task and scientific discoveries often happen when they are least expected. However, I distinctly remember that even as I was learning to sort male and female flies under a microscope, I naively entertained the thought that perhaps I would have a moment similar to Alexander Fleming’s chance discovery of penicillin. Maybe I would stumble upon a groundbreaking discovery while staring at my flies’ bristles at 40x magnification. Of course, it did not take me long to realize that major scientific discoveries do not occur overnight—they result from years of hard work. Often, I’d run into Professor Wieschaus or other lab members on Sunday mornings, late on weeknights, or even over winter breaks when they’d pop in to collect embryos, continue experiments, or write their papers. As an impatient undergraduate, I was endlessly inspired by Professor Wieschaus and my fellow lab members’ perseverance, creativity in problem solving, ability to keep discouragement at bay, and consumption of caffeine. I was hardly ever in lab alone.

I did not enter the lab knowing the exact topic on which I wanted to write my thesis. Upon joining the lab, I became exposed to the processes of *Drosophila* embryogenesis, the series of ordered and precise steps that ultimately transforms a nondescript ball of cells into a complex, functional organism. I was intrigued by the superficial simplicity of the early embryo and the questions of how it develops the complexity of an adult fruit fly. What are the invisible forces and agents guiding each cellular division and fold? I learned that during oogenesis, the female fly’s ovaries are not mere incubators for the eggs. The mother actually provides the unfertilized egg with mRNA and proteins that selectively target and pattern the expression of zygotic genes to orchestrate downstream transcriptional and morphological changes. The interaction between maternal and zygotic genes during development is one of the large questions pursued by members of the
Wieschaus lab. Part of the beauty of biology is that the story is always more complicated, and in pursuing the opportunity to better understand the process of embryogenesis, I found myself digging deeper and deeper into the complexities of a question that ultimately led to my senior thesis.

I was fortunate to be able to work closely with two postdocs who tried to elucidate the “invisible” genetic mechanisms and regulators of different steps of embryogenesis. I am very fortunate to have had two patient and knowledgeable mentors who slowly helped me bridge the gaps in my scientific knowledge and expand my laboratory skills. Jennifer Zallen was the first to take me under her wing, and I worked with her on a project studying how signaling polarity is established and how it then coordinates cellular movements during germband elongation (a major developmental step during embryogenesis). I worked closely with Jen until the fall of my junior year when she left to begin a professorship at Memorial Sloan-Kettering Cancer Center. Due to the type of experiments I had been doing with Jen and my interest in the Notch signaling pathway, I began working closely with Stefano De Renzis on a project that aimed to elucidate the interaction between the maternally provided Notch signaling pathway and the Snail-dependent zygotic transcription network that precisely specifies the formation of the mesoectoderm tissue during early embryogenesis. My work with Stefano used a combination of chromosomal deletions and microarray analysis to first identify a family of genes that appeared to regulate the trafficking of proteins we believed to be important in biasing Notch signaling and leading to the subsequent formation of boundaries for mesoectoderm tissue specification. To further characterize the differential localization patterns, regulation, and activities of maternal and zygotic Notch protein, we studied Notch maternal germline clone and Notch deficiency embryos in parallel. We synthesized our observations into a “Trafficking Model of Notch Signaling” during mesoectoderm specification. Throughout this collaboration, Stefano and I worked closely with Professor Wieschaus to think of novel approaches, to tweak experiments, and to interpret our results. All of this work eventually cumulated in my senior thesis.

In college, I formed many families of friends, colleagues, and mentors. The members of the Wieschaus lab became one of my families, and my thesis project was a major part of my undergraduate life. Writing this thesis reflection has made me realize not only how far I have come from that over-eager high school grad, but also how fortunate I am to have been given so many opportunities at Princeton. I am envious of this fall’s entering class of freshmen, of the sophomores who are beginning to wrestle with choosing a major, and especially of the juniors who are just beginning to grapple with the thesis challenge. As initially daunting as the thesis may seem to a freshman, my recommendation is to be bold, to start early, and to seek... find a project that will compel you to go into lab on a Thursday at midnight.
out an adviser who truly inspires you. Just as the female fly is actively involved in the maturation of her eggs, Princeton actively invests a staggering amount of resources and faculty into the development of its undergraduates. Princeton has provided us free access to a world-class faculty who will become personally invested in helping you find a compelling thesis question, a campus with state-of-the-art facilities at your disposal, and a close-knit class of intelligent and motivated students who will go through this same process with you. In these four years, you will be surrounded by occasions to seize the guidance, tools, and opportunities to enhance and discover your personal strengths and goals. Make the most of your time at Princeton and find a subject that will make those hours in C-level Firestone fly by; find a project that will compel you to go into lab on a Thursday at midnight. The senior thesis is a uniquely Princetonian experience and if you engage and invest yourself, you will be bountifully repaid.

Eric F. Wieschaus
Squibb Professor in Molecular Biology

Most molecular biology majors do their senior thesis with a professor in the department and most look back on the lab component as the central learning component of their undergraduate years at Princeton. Typically the thesis starts with a research proposal in the spring semester of the junior year, an exciting, heady immersion in the scientific literature that provides a background for the experimental work to come. The senior year is then spent polishing those plans and, more realistically, getting experiments that seemed reasonable on paper to actually work. Science is hard, and acquiring new knowledge takes time, often more time than is available in the nine months of the senior year. For almost every graduating senior, the thesis provides a firsthand measure of the practical distance between a beautiful idea and a successful experiment. Almost all graduating seniors wished that they had just a few more months to get that crucial result.

Jessie’s experience of undergraduate research differed from most molecular biology majors in that she joined my lab as a freshman. She had four years rather than just two senior semesters, sufficient time to try different techniques and work with different members of my lab. Science is an intensely social activity; most practicing scientists depend on colleagues with whom they can talk about experiments and troubleshoot failures. Working with two different postdoctoral fellows on two different projects during her first three years gave Jessie the background to turn her own experiments into an important paper.

Science takes time. Like all things in life, how much you get out depends on how much you put in. Jessie put a lot of her undergraduate time into her research, and although she had other activities and interests, she still found the time to come into the lab on the weekends and late at night to push her experi-
Part of the secret of her productivity was her early start. By her junior year she had mastered many of the essential techniques and was able to work pretty much on her own schedule. In the last two years, when she and I talked, it was mostly about her results and what they might mean. It never seemed necessary that I spend the time explaining techniques or supervising individual steps in a protocol.

Studying at Princeton is a very rich experience. The opportunities are great and each undergraduate has to choose where to invest his or her time. The traditional senior thesis research experience provides a good balance between exposure to laboratory techniques and the freedom to follow many other nonscientific interests. Jessie’s more intense four-year immersion in lab work represents an alternative—one that provides a deeper exposure to how science is actually done. I believe it is an alternative that every undergraduate should at least consider.
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