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Dissertations: Past, Present, and Future

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by

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Table of Contents

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ABSTRACT

Current policies and traditions regulating the dissertation process are responsible for a devaluation of dissertations and fail to recognize the economic and technological developments wrought by the emerging Internet. Some of the problems with the current process involve ideology, such as the insistence that dissertations be single-authored, original, and owned by someone. Others involve adherence to traditions that no longer serve a useful purpose, such as forcing authors to conform to a format better suited to a printed book than an online project. Finally, economical considerations such as the costs involved with purchasing and training authors to use advanced technology and an overall resistance to technology are inhibiting the evolution of the dissertation and stifling progress.

Scholars and administrators must be willing to change their attitudes and policies towards the dissertation process. Specifically, they should consider how electronic writing spaces differ from print spaces and allow students to find innovative uses for images, sounds, videos, and interactive segments. Secondly, they should allow authors to collaborate with others in the dissertation process and quit emphasizing originality or adherence to rigid conventions that make dissertations difficult to read and write. Thirdly,

they should seriously question the economic imperative to let authors copyright their work and should instead make every effort to ensure the fruits of these labors are available to all.

A decisive reformation of the dissertation process will naturally stimulate wider and more influential changes to scholarship as a whole. Scholars must understand how to collaborate effectively and disseminate their research. Administrators must find ways to properly evaluate faculty when making hiring, tenure, and promotion decisions. The scholarship of the future must take into consideration the possibilities inherent in the electronic writing environment and not be ruled exclusively by conventions and norms better suited to print. The Internet offers scholars a new and powerful collaboration tool which can radically improve the production and dissemination of scholarship; however, the new scholarship will differ markedly from the conference presentations, journal articles, and scholarly monographs so long associated with scholarly activity. A focus on how the dissertation process can change to better accommodate and take advantage of the Internet and advanced digital technology provides insight into how scholarship as a whole might successfully move into the future.

Chapter One

Updating the Old Power Grid

At 4:10 p.m., August 14th, 2003, the lights went out across the Northeast United States.

Trains stopped. Elevators ground to a halt. In Michigan, water stopped flowing. In New York, subways stopped and were evacuated and 600 trains were left stranded (Barron A1). For hours, millions of Americans were without power after 21 power plants went offline in the largest blackout in American history. Some blamed a computer virus; others, still shaken by 9/11, feared terrorism. New York Mayor Michael Bloomberg mobilized 40,000 police officers to protect citizens, arrest looters, and maintain some semblance of order amid the chaos and panic.

The problem turned out to be something far less shocking than terrorists or rampant *Blaster* viruses. Unlike 9/11, this disaster had not caught the experts by surprise. John Casazza, a former utility executive, had predicted along with several other experts that the power grid was in serious danger of failing. Casazza's warnings, along with those of his peers, were unheeded.

Many people wrongly thought the problem was obsolete equipment. Governor Bill Richardson of New Mexico complained that "We are a major superpower with a third-world electrical grid. Our grid is antiquated. It needs serious modernization" (qtd. in Firestone and Perez-Pena A1). The media tossed around terms like “obsolete power

grid," which led most people to think the problem lay in faulty conductors or aging cables.

The true problem was a new economic policy that ignored the reality of how electric power is distributed. The fault was not with the grid, but with the laws passed to regulate it. The blame for this disaster lies with policy makers, who simply could not be bothered to consider the consequences of their policies. James Barron of the *New York Times* put it this way:

> In promoting deregulation in the 1990's, advocates had visions of vast waves of electrons being wheeled around the country on short notice, from producers to distributors to consumers, in rapid, highly efficient response to shifting supply and demand. In reality, the transmission system limits the ability to do that, especially when it comes to pushing power into and out of some major urban areas. (A1)

The deregulators' efforts to improve the system nearly destroyed it.

The Energy Policy Act, passed in 1992, "deregulates" electricity and eliminates monopolies. It does so by treating electricity as a commodity rather than a service. The idea was that energy should be traded on the market like widgets. If a power plant in California can produce energy more cheaply than one in New York, why not just import electricity the same way we do oranges? The problem is that importing electricity isn't nearly this simple. To import electricity, power must be transferred from one power plant to another in a long daisy chain. Furthermore, electricity cannot efficiently be stored—unlike water, which can be conveniently stored in large reservoirs or towers, storing

electricity is a difficult, cumbersome, and expensive process. Storing electricity in batteries is at least as expensive as producing electricity, and the rarity of materials like nickel and cadmium make the production of batteries expensive (Berry, "Present"). In short, an electrical distribution that treats electricity as a commodity is impractical.

The problem with the new system was instantly apparent to most engineers. The transmission lines were designed to handle only very specific loads of electricity. The advantage of the old monopoly system had been that the local power company knew exactly how much electricity was pumping through its transmission system; the transmission company only had to deal with one generator company. Now transmission companies were being required by law to transfer electricity from anywhere at anytime. No questions asked. The system was doomed to failure.

Soon enough, operators in Ohio fumbled and their lines overheated. The blackout spread as more and more companies, depending on power that should have been funneled from elsewhere, discovered that the daisy chain was broken. They, in turn, were unable to transfer power to other companies. The result was the giant blackout of August, 2003.

Networks like the Northeast power grid are large, complex, and confusing. Even experts struggle to understand how they work. Duncan J. Watts, a network systems theorist, describes such power grids as the most "essential technological feature of the modern world" (20). Watts believes that it is all too easy for legislators and policy makers to ignore such systems' many interdependencies—with disastrous results. If legislators wish to avoid another blackout, they must ensure that they do not act hastily and fully contemplate the potential consequences of their policies.

This story is a useful metaphor to preface my own warning about the potential failing of another poorly understood power grid: The scholarship network of American public universities. The network I have in mind is that which ensures that the knowledge generated in each university is able to flow smoothly from one body of scholars to the next to advance academic fields and satisfy the intellectual demands of nations. Traditionally, scholarship generated by scholars at one university has been shared with scholars at other universities via academic conferences and printed publications (bulletins, journals, and books). In this system, the "power" of individuals is based on the frequency and applicability of their publications; quantity, but also quality. By "applicability," I mean the overall importance and influence of a work, which are measured by the number of times a work is referenced or cited in other works. As long as the bulk of scholarship being produced across the nation was fairly limited, this publication system ensured that scholars had reasonable access to the information they required to remain active in their fields. Unfortunately, it rapidly became apparent that the production of journal articles and scholarly books was overwhelming the university press system, and, in what ultimately become a dangerous mistake, universities turned to commercial presses to pick up the burden. These commercial presses brought with them the laws and contracts they had developed to successfully market works for the public—copyright laws that stood in stark contrast to the openness and accessibility that efficient scholarship demands. Sadly, the universities dealt with this dire situation by recklessly applying policies better suited to the marketplace than to the production of scholarship.

These policies treat a *service* as though it were a collection of *commodities*, and, unless we take drastic action now to correct the policy, the network of American scholarship may one day suffer a "blackout" as potentially disastrous as the one suffered by the Northeastern power grid. The laws and customs that have come to regulate the scholarly network must be changed if we are to avoid severe and long-lasting damage to the scholarly enterprise. Reforming these policies means not only moving away from print and embracing electronic publication technology (which seems almost inevitable), but also refiguring our concept of scholarship so that we can take full advantage of what the new medium has to offer. Scholarship must return to its roots as a meaningful, open discourse that is freely available to anyone who is willing and able to benefit from it. As productive scholars, we are largely aware of the problems facing scholarship—however, the solution to these problems is far from clear. Thankfully, there is already a model in place that we can follow to help us reform scholarship: The Free Software Movement, which is itself based on the "Hacker Ethic" of a group of programmers working and studying at MIT during the 60s and 70s. Richard Stallman, a third-generation member of this group, founded the Free Software Foundation in 1985 to promote "computer users' rights to use, study, copy, modify, and redistribute computer programs" (Free Software Foundation). The foundation supports the development of software licensed under the General Public License, which automatically grants users these rights and makes it illegal to use GPL-licensed code in proprietary projects. Another of the foundation's goals is to "spread awareness of the ethical and political issues surrounding freedom in the use of software" (Free Software Foundation). Free Software should not be confused with Open

Source software. Though both free software and open source software provide the source code for others to read, Open Source is meant to be less "idealistic" and less threatening to business:

> The Open Source movement […] takes a more “pragmatic” approach, preferring to base its arguments on the economic and technical merits of making source code freely available, rather than the moral and ethical principles that drive the Free Software Movement (Cantrell, Johnson, Lumens, *Slackware Linux Essentials*).

To put it simply, describing one's software as *free software* is a rhetorical choice that reveals a programmer's ethical beliefs about how software should rightly be licensed. As one commentator puts it, "Open Source is a development methodology; free software is a social movement" (Stallman, "Why 'Free'", 55). The Free Software movement, which privileges openness, free access, and de-centralization, provides a sound paradigm we can follow if we hope to solve the growing problems of modern scholarship[1].

When the question is how we can make the most of computer technology, scholars do well to turn to how the pioneers and "hackers"—the innovators who helped make the Internet and the GNU/Linux operating system possible—philosophize about their work and what technological features they value most. Howard Rheingold writes that "the Internet was deliberately designed by hackers to be an innovation commons, a laboratory for collaboratively creating better technologies" (48). Hackers have indeed used this commons to create sophisticated and widely adopted software. The number one

[1] The practice I've followed is to use *open source* or *free software* as the various developers and authors I discuss use them to describe their projects. The words are not interchangeable.

web server in the world, Apache, was not built by professional programmers working for a private corporation, but constructed overtime by people "motivated to help the project, not from people just paid to code from nine to five" (Lessig, *Future*, 56). Other hackers built BIND (Berkeley Internet Name Daemon) and "sendmail," two open code projects which have shaped the modern Internet. These coders used the Internet to collaborate and build powerful applications for all to share. If hackers can use the Internet to build good software, scholars can use it to create good scholarship.

Scholars might not realize the similarities between how they produce scholarship and how free software programmers produce programs. Mario Biagioli calls free software development "the business practice that comes closest to science" (258). Free software programmers consider the programs they write to contribute to a communal pool of knowledge. Free software programmers frequently refer to themselves as "hackers." The term *hackers* carries an important connotation of playful creativity. As Richard Stallman, founder of the Free Software Foundation puts it:

> *Hacking* refers to a mental attitude: deriving pleasure from playful cleverness. It is often done with computers, but it is not limited to computers. Hacking can be done in any medium, in any area of life. (Stallman, "Re: Help").

Hackers, unlike some programmers, do not view themselves as working merely to earn their pay. The element of playful creativity is what I particularly want to retain in my discussion of free software, even though I acknowledge that many, if not most information technology professionals, *hacker* is a pejorative applied by the mass media to

malicious programmers. Though such people obviously exist, the hackers I am concerned with view such activities as beneath them; they are *creative* rather than destructive. The definition of "hacker" in Eric Raymond's *Hacker's Dictionary* makes this clear:

> **Hacker.** 1. A person who enjoys exploring the details of programmable systems and how to stretch their capabilities, as opposed to most users, who prefer to learn only the minimum necessary. 2. One who programs enthusiastically (even obsessively) or who enjoys programming rather than just theorizing about programming. 3. A person capable of appreciating hack value. 4. A person who is good at programming quickly. 5. An expert at a particular program, or one who frequently does work using it or on it; as in `a Unix hacker'. (Definitions 1 through 5 are correlated, and people who fit them congregate.) 6. An expert or enthusiast of any kind. One might be an astronomy hacker, for example. 7. One who enjoys the intellectual challenge of creatively overcoming or circumventing limitations. 8. [deprecated] A malicious meddler who tries to discover sensitive information by poking around. Hence `password hacker', `network hacker'. The correct term for this sense is cracker. (Raymond, "Hacker")

Raymond, author of several influential books on the open source movement, makes a distinction above between *hackers* and *crackers.* For programmers like Raymond, the term *hacker* is an accolade that carries tremendous weight within the free and open source community, whereas *cracker* is akin to "criminal." Though hackers, crackers, and

9-to-5 employees working at IBM or Microsoft might all be correctly labeled "programmers," some important connotations are lost if limit ourselves to that term. I have chosen to use the term *hacker,* then, because it is the term the specific community of programmers I am interested in themselves use, and also to retain the element of "playful creativity" so central to their approach to programming.

Hackers believe that freely sharing techniques, algorithms, and theories with their colleagues is the surest way to further progress in the field. This belief is directly parallel to a similar belief among most scholars that knowledge can be best advanced if they share the results of their research with the world. Daniel Coit Gilman, the first president of John Hopkins, famously put it thusly: "It is one of the noblest duties of a university to advance knowledge, and to diffuse it not merely among those who can attend the daily lectures—but far and wide" (qtd. in Parsons, 12). University publishing was created as a way to efficiently disseminate scholarly knowledge—not merely to bring prestige to authors and certainly not to earn profits for publishers. Electronic publishing allows us to return to this ideal; no longer must we be burdened by the high costs of print publishing and accept its damage to our environment. Neither must we allow so much scholarship to be prevented from entering the field by publisher "gatekeepers," who, mostly for economical reasons, must turn away so many valuable manuscripts. However, even more important is to separate the *form* of so much contemporary scholarship from its *function*. While we can agree that the function of scholarship should not change, its present form has been shaped by the material conditions of print publishing and should be enhanced to

better accommodate the possibilities opened up by electronic publishing—particularly the collaborative possibilities.

Hackers serve as a useful model because they, perhaps more than anyone else, have adapted their practices to take best advantage of the electronic environment. Though business interests long ago caused a schism among hackers, in which many embraced contemporary notions of intellectual property and trade secrets, others remained true to a code of ethics later termed "the GNU philosophy." Increasingly, this disenfranchised group has achieved remarkable success with GNU/Linux, a free operating system, and countless other widely popular free software programs that rival and are often superior to their proprietary counterparts. Source Forge, a website designed to facilitate open source projects, has over a million registered users and over 99,000 registered products in development[2]. Undoubtedly, not all of these products will be completed, and even fewer will be as successful and effective as the GNU/Linux operating system or Mozilla's Firefox web browser—yet this high volume of activity cannot be ignored.

A common argument against free software is that it cannot possibly compete with commercial juggernauts like Adobe or Microsoft. To name one commonly used example, the free graphics editing program *GIMP* is widely held by graphics professionals as vastly inferior to Adobe's *Photoshop*. Such professionals may acknowledge their support for the free software movement, but simply cannot afford to work without *Photoshop's* extensive functionality. This excuse does not sit well with the "hard core" free software enthusiasts, who feel that it is more important that a program does not restrict their

[2] See the *Source Forge* homepage at http://sourceforge.net

freedom than whether it outperforms or even rivals a proprietary competitor. This is perhaps one of the key differences between "open source" and "free software" advocates; the former has no problem mixing and matching free and non-free software for efficiency's sake, whereas the latter will stoically do without rather than compromise. Though this "no compromise" is unrealistic for most practicing scholars, we might nevertheless recognize the desirability of the free software philosophy and use free software whenever it is *feasible* to do so. Sun's *Open Office* suite certainly rivals Microsoft's *Office,* and would more than suit most of our needs in the humanities. Now that scholars are entering the digital age and trying to find ways to adapt scholarship to the new medium, they can learn by studying the GNU philosophy and considering how the "free software" model might enable new forms of scholarship. Of course, this will not occur overnight, nor will it likely succeed by fiat. However, perhaps as more scholars learn about the public benefits of free software, they may feel inclined to begin experimenting and choosing free software alternatives to popular proprietary packages.

The Hacker Ethic is described by Steven Levy, whose famous book *Hackers* has given us the richest description of the lives of this group of a group of MIT students and computer science professors who practiced and flourished under these ethics. According to Levy, the first and second generations of these programmers lived by an unwritten code of ethics, which he defines as follows:

- Access to computers—and anything which might teach you something about the way the world works—should be unlimited and total. Always yield to the Hands-On Imperative! (27)

- All information should be free. (27)
- Mistrust Authority—Promote Decentralization. (28)
- Hackers should be judged by their hacking, not bogus criteria such as degrees, age, race, or position. (30)
- You can create art and beauty on a computer. (30)

These five tenants, if applied to scholarship, have potential to help solve its problems. Throughout this dissertation I will describe how each tenant can be applied to scholarship.

Scholars in Crisis

Is scholarship really in a crisis? Such a question is difficult to answer, simply because the term "scholarship" is open to interpretation. Surely, scholarship in one form or another will continue even if every public university in existence were ground to dust. However, if we understand scholarship as a methodology determined by a print paradigm, then we might see how it could indeed be facing a crisis. Though I will discuss what I mean by "print paradigm" more thoroughly in the fourth chapter, I will define it here simply as the implicit and explicit assumptions, derived ultimately from print technology and print culture, that are always in the background of any scholarly discussion of scholarship. That the great majority of scholars take for granted that *true* scholarship is manifested mainly, if not exclusively, in the form of print publications seems senseless to dispute. Walter J. Ong and other literary historians have built whole careers studying the intense and far-reaching effects that writing and print have had on

our cultural conceptions of knowledge. Past technological innovations such as radio, film, and television may have revolutionized many aspects of culture, but they have not caused scholars to abandon their books. If, as Jay David Bolter and so many other new media scholars argue, digital technology is poised to remediate print technology, the question remains whether scholars will change their way of life or merely write about the new technologies from time to time in their neatly printed journals (or books like Bolter's *Writing Space*). It is more likely that some scholars will boldly experiment with new forms of scholarship while others read about them from a safe distance.

It would take a true crisis to force a paradigm shift in scholarship—and such a crisis may be upon us. Like most crises of epic proportions, this one does not stem from a single, clearly discernible source. One source is economical, another is political. Perhaps most baffling of all are the problems brought on by digital technology, which offers us liberation at one moment and tyranny the next. One extreme of this Janus is the bearded hacker's face; the other is the clean-shaven face of the corporate executive. Neither extreme is a viable solution to the problems facing scholarship. The only thing that *is* clear about all of these problems is each day they grow more serious. Decisions must be made—and, like those decisions made by well-meaning legislators over the Northeast power grid, the wrong ones will have disastrous results. We must try our best to understand how good scholarship really works before making and enforcing policies to regulate it.

Perhaps the most obvious and pressing problem with contemporary scholarship is its sheer bulk. In the past two decades, the rate of scholarship production has soared to

almost unimaginable proportions. According to the National Center for Education Statistics, 45,000 new PhDs were awarded in 2001, and these numbers are expected to rise by at least 5% within the next decade, and with already fierce competition for jobs and promotions in almost every field, the incentive to "publish or perish" has never been so valid for so many scholars.[3] In a 1989 national survey of faculty sponsored by the Carnegie Foundation, 60% of faculty at four-year universities strongly agreed that it is difficult to achieve tenure in their department without publications (Boyer A-1). Prestigious research universities demand that professors regularly publish and may pay short shrift to teaching—in the same survey, only 20% of four-year faculty claimed that teaching effectiveness should be the primary criterion of faculty promotion (Boyer A-23)—yet 26% said that they were more interested in teaching than research (Boyer A-27). Perhaps more significantly, 47% of the respondents at four-year universities said that their publications were merely quantitatively measured and quality was ignored in tenure and promotion decisions (Boyer A-24). The high attention paid to publication seems to make little sense when we consider how much time professors spend teaching. According to a 1999 by the National Center for Education Statistics, even full professors at four-year doctoral-granting universities spend up to 42% of their work time engaged in teaching activities (Chen, Table 9). The high priority given to the quantity of professors' publications neglects the other culturally significant tasks that dominate their time. Paul LeBlanc argues that, especially for professors of humanities, "Our society increasingly questions the value of what academia delivers" (115). According to LeBlanc, the articles,

[3] I should note here that many smaller universities and colleges do not require or even expect their faculty to publish new research; good teaching skills and quality service take precedence. The “publish or perish”

chapters, and books that are so crucial for hiring and tenure in humanities departments seem worthless outside of those departments: "How often has the title of a new article or book become the butt of some comedian's joke or outraged legislator's harangue?" asks LeBlanc (116). A 1995 survey published by the Modern Language Association found that 80% of MLA members find the society's premier literature journal, *PMLA,* to be irrelevant to their professional lives, and only 21% report that they regularly read the articles (Stanton 184). Thus, only a small minority of professors working in the field of literary studies find their flagship journal useful enough to even bother with the articles. In *The Goose-Step: A Study of American Education,* Upton Sinclair describes the situation with blistering sarcasm:

> Slaves in Boston's great department store, in which Harvard University owns twenty-five hundred shares of stock, be reconciled to your long hours and low wages and sentence to die of tuberculosis—because upon the wealth of what you produce some learned person has prepared for mankind full data on "The strong Verb in Chaucer" (90).

Such vitriol hurled at humanities departments may be unfairly exaggerated, yet it does cause us to consider the value we do offer the citizens who support our mission—and how to describe it in language more flattering than Sinclair's.

The insatiable demand for scholarship has put great stress on poorly-funded university presses, and commercial companies have swooped in like vultures to feast on riches ground from aspiring and established scholars alike. All the while, the overflow of

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mentality is more common at major research universities.

information in the form of articles, books, reports, dissertations, and theses is threatening to at last "trip the breakers" and "overload the circuits" of financially bankrupt university libraries, who must absorb the cost of all this publication. What library is large enough to hold the tens of thousands of books and journals printed each year by the juggernaut of modern academic publishing? Harvard University's library, the largest academic library in the world, contained 13,982 million volumes in 1998 and spent over $84 million that year (NCES, DES, Table 423). Yet even Harvard's libraries must struggle to keep important scholarship on its shelves and is rapidly forming initiatives to digitize its collection and build electronic archives in order to save space.

Even a university library as mighty as Harvard's cannot hope to store enough copies of *every* important and relevant work of scholarship. The Royal Library of Alexandria would hold but a teaspoon of this ocean of manuscripts. Even the best-funded libraries find it difficult to keep their shelves stocked with the latest books and print journals. The first problem is physical space—where will all these books be stored?

The imperative that scholars publish in print as frequently as they can if they hope to secure tenure and promotion is the root of this problem. Surely, anyone who has taught in a research university is aware that a good deal of work we might easily classify as "scholarship" occurs independent of any academic publishing house. The "Invisible College" is, of course, still alive and well in the 21st century as it was in the 17th, when Robert Boyle first used the term to describe his small group of colleagues interested in furthering the ends of experimental science—outside the highly structured environment of universities or schools (which privileged the authority of the ancients over knowledge

gained from empirical research). Today, the term "Invisible College" may refers to groups of scholars who attend conferences, send emails, participate in online forums and listservs, and engage in thoughtful inquiry with their students during classes. The term might also refer to a form of elitism highly detrimental to research and the research community. Derek J. De Solla Price writes that invisible colleges are

> the hierarchical elite resulting from an expectable inequality, and numbering about the square root of the total population of people in that area of research front. They automatically reinforce their exclusiveness only by their excellence and by the overpowering effect of their contribution relative to that of the rest. (74)

According to Price, only a very small percentage of practitioners in any given field have significant influence over it; their contributions greatly outweigh everyone else's and give them an unfair advantage. While it would be going too far to say a conspiracy exists to silence other's voices, Price's perspective on "Invisible Colleges" may indicate why evaluating professors purely on publications is unfair—those outside the "clique" will have a disproportionately tough time getting their voices heard. "Scholarship is rather like George Orwell's pigs," writes Price, "because all its items of information are equal, but some are very much more equal than others" (74). The politics of print publishing are very real, and carry great consequences for scholars whose careers depend on publishing articles and books.

One reason why print publication plays such a critical role is that it is easier for administrators to evaluate professors based on a *quantifiable* measure like the number of

books and articles they have published than the more important but abstract consideration of how helpful or influential could have been to others in their quest for knowledge. While no one would say that an academic field can be defined as the sum total of its members' publications, they do indicate who is included and excluded from the "Invisible College" of a field or sub-field. Meanwhile, the value of all these print publications to the field has fallen. The long (and often intolerable) delay between submission and publication means that at best, these many books and articles serve mostly as a dated record of where the field has been than a map of where it is headed. If these trends continue unabated, then print scholarship may become like high school yearbooks, complete with "Who's Who" and photos of the winners of various popularity contests—while the vital discussions occur online.

The over-emphasis on publishing also has another cost: teaching. Publications help professors "move up the academic ladder" and into institutes where they will not be asked to teach as many classes as their less prolific colleagues. Since teaching plays such a small part of so many tenure and promotion decisions, ambitious professors spend far more time engaged in research than planning or managing the classes they teach. The value of graduate education, particularly in the humanities, has perhaps never been as seriously questioned as it is now. State support for such programs is drying up all over the nation for a reason: The research so highly prized by the professoriate serves no obvious and inarguable benefit to the communities they depend on for support—while good teaching, which does, receives short shrift. A university education is becoming a very heavy burden on the students within their walls—and universities are growing as a

greater percentage of high school graduates realize that a college degree is a prerequisite for quality employment. These students, faced with steeply escalating tuition costs, are desperate for a cheaper, quicker alternative. They see a college education not as a privilege but as a necessary evil. Eric Gould writes that perhaps the greatest danger to higher education is "for-profit and Internet-based proprietary schools" (34). According to Gould, these schools "insist that knowledge is *only* a commodity […] Knowledge simply has to be packaged and marketed for public consumption" (34). Gould fears that online universities like the University of Phoenix have "found a more efficient way of delivering the goods" (35). The annual College Board's *Trends in College Pricing* found that the average costs of yearly tuition and other fees for in-state students at public 4-year universities was $5,132 in 2004, a 10.5% increase from 2003 (3). The University of Phoenix's website advertises a full year of online classes for less than $10,000 (University of Phoenix). The website also notes that "When you factor in the value of your time, our online program becomes an even better investment" (University of Phoenix). Getting a college degree as cheaply and quickly as possible has become the goal of many students. Amy Wu, herself a recent college graduate, writes in the *New York Times* that "higher education has become a bothersome stage of life that must be endured solely to satisfy the marketplace with that decorated piece of paper. It is now more a burden than a benefit, more a curse than something coveted" (12).

Another problem with current scholarship is cost, which exists whether the books and journals are in print or electronic form—indeed, many commercial databases charge just as much (if not more) for electronic access to documents as they do for print

versions. Many scholars are compelled to turn the results of their work over to commercial publishers who promptly claim full, perpetual copyright over the work and use their monopolistic power to bleed library budgets bone dry—all at the expense of the dissemination of scholarship. Even Harvard's famous library has begun canceling subscriptions to journals—particularly journals from for-profit corporations like Elsevier. Stuart Shieber, a Harvard professor of computer science, reported that the Division of Engineering and Applied sciences "realized that half of our serials budget was going to Elsevier [and that] it was in our best interest to cut dramatically, in the end cutting back from 131 Elsevier journals to about 35" ("Libraries Take a Stand"). More libraries are saying "No, thanks" to publishers offering materials and "I'm sorry" to scholars who demand access to them.

One solution to this dilemma might be to charge the scholars on a pay-per-view basis, a trend we already see taking place with dissertations. To download an Adobe PDF version of a dissertation from UMI's Digital Dissertation service will cost an individual, university-affiliated scholar at least $28, though the first 28 pages are available via ProQuest's databases. UMI is a business that can only survive by charging for access. Universities could make these same documents available for much cheaper.

Richard Stallman, founder of the Free Software Foundation and the GNU Project, has outlined how this could be done. First, the library would use the existing university network to distribute the dissertations, and an inexpensive PC running GNU/Linux to store them—a $1500 machine would likely suffice. The cost of putting dissertations into the machine would be much cheaper if they were already in electronic form (a reasonable

stipulation considering that almost every dissertation author uses an electronic word processor to produce the document). According to Stallman, "The upper bound on the cost per dissertation would be $30 or so. This is not the cost per dissertation download; it is the cost per dissertation, for all its downloads over the years" (Re: Help). This figure is much lower than that projected by Gail McMillan, Guylaine Beaudry, Susanne Dobratz, and Viviane Boulétreau in the "Costs" section of the *ETD Guide.* McMillan et al. calculate the start-up costs of a library trying to duplicate Virginia Tech's ETD program to be at least $65,000. This figure is so much higher than Stallman's because it assumes that the library will need a full-time programmer for at least a year, and the costs of certain equipment like a compact-disc burner are estimated to cost at least a $1,000—though they are much cheaper today. The plan also calls for expensive proprietary software ($15,000 worth). Even still, Virginia Tech saved approximately 66% of their processing costs per thesis or dissertation by switching to an all-electronic format.

If UMI is able to do all of this work for us, why should libraries bother to setup their own ETD programs? Some might argue that $28 is a small sum to ask to download an entire dissertation, and for many American scholars, it is not a significant obstacle to warrant discussion. However, $28 may represent a small fortune to scholars in less industrialized nations, and graduate students engaged in research may decide to overlook such sources rather than make the necessary sacrifice. A good question to ask here is why more universities and authors of theses and dissertations aren't making their dissertations freely available on the web. UMI does not claim the copyright of theses and dissertations;

these rights are retained by the authors who may decide to make them freely available online.

Some authors of theses and dissertations may desire to make money by selling copies of their work. One service that exists for assisting new scholars in this practice is Dissertation.com, a company that archives dissertations and offers fee-based downloads and print-on-demand. For a $150 fee, Dissertation.com will secure an ISBN number for the book, which will allow it to be found and sold through book-sellers like Amazon (Beamish, "Rescuing."). Scholars can download an electronic version for $6 or a print version for $20 or more, with the authors receiving a 20-40% royalty (Dissertation.com, "Why Publish?") Though the royalties are small, they are greater than those offered by UMI, which grants authors a 10% royalty if they sell seven or more copies of their work a year (Beamish, "Rescuing"). In either case, it seems likely that most neophyte scholars would benefit more from the added exposure of a well-publicized and thoughtfully indexed free dissertation than the $5-$150 they might earn selling copies through Dissertation.com or UMI. Scott Goetz, who sold two copies of his dissertation through Dissertation.com, commented that "very few people read a dissertation. This is a reward in that it's not just gone into obscurity" (Beamish, "Rescuing"). Scholars like Goetz seem unaware of the Networked Digital Library of Theses and Dissertations, a growing index of electronic theses and dissertations, many of which are *freely* available for download. The top accessed ETDs at Virginia Tech in 2003 were all fully available for free online. The top five were accessed 72,440, 60,575, 50,740, 44,071, and 43,773 times respectively (VT Digital Library, "Some Facts"). Scholars hoping to win publicity, gain

recognition, and make an impact with their dissertation or thesis should make their work as widely and freely available as possible.

Dissertation authors like Goetz probably feel as though there is little demand for their work. After all, they are generally discouraged from relying on them when preparing their own dissertation. Students are taught in research classes that the publisher of a source is an important criteria for evaluating it—an unpublished dissertation is thought less credible than a book published by a prestigious university press. The idea is that if the dissertation were good enough, it would be published by a good press. Perhaps there is limited demand for free access to dissertations because they are not now as useful as they once were, nor are they as highly demanded as other types of scholarship. We could try to remedy this situation by changing policies regulating their production and dissemination. This could take place at a micro-level by having students and scholars pay individually for access to increasingly expensive and ubiquitous materials or at a macro-level by reforming scholarship itself.

It's not enough just to abandon print publication and start dumping books and articles onto the web. This may reduce the costs associated with print publication, but will not solve the problem of overproduction or lack of quality control—in fact, without the checks in place to prevent the publication of questionable studies, electronic scholarship will likely suffer worse from a surge of low-quality scholarship than print. We must also resist giving commercial enterprises the sole right to publish electronic scholarship—they will only be able to recoup their losses and earn profits by restricting the flow of scholarship. Michael Perelman points out that since academic reviewers,

editors, and authors mostly work without pay it does not make sense to allow a third-party to earn a profit (91). Furthermore, we must work to ensure that the electronic versions of dissertations are not stored *exclusively* in closed-source, vendor-controlled formats, such as Microsoft *Word*'s .DOC format. Though more will be said on this subject later, suffice it here to say that we should do everything we can to promote the openness, accessibility, and compatibility of dissertations for all other scholars. Selecting a vendor-controlled and heavily patented file format is a step in the wrong direction.

What is called for, then, is to reform scholarship so that it takes full advantage of online writing environments. The tools we should be exploring include filtering, searching, collaborating, and peer-reviewing functions that can keep quality high, access free, and participation open. The aim of the new scholarship will not be to produce as many "units" of scholarship as possible, but to offer the best *service* to ongoing collaborative scholarly projects based online. This service will take many forms—scholars will not only add new material and insights, but also work to edit or review existing material. Scholars will discuss changes, new approaches, methods, and terms and incorporate them without recourse to the publisher, whose electronic equivalent, the "web master," will not serve as gatekeeper, but as an architect and custodian whose mission is not to restrict access, but to enhance it.

My contentions are as follows:

- One, we must stop thinking of scholarship (including dissertations) as the *production* of isolated works and return to an older conception of scholarship as a

service to humanity. This will help solve the problem of overproduction of "units" of scholarship.

- If we ask our scholars to perform research and share the results of that research, the least we can do in return is see that the work is made available to other scholars. *Access to these documents should be free*, both in terms of access and application, and protected by a public license such as *Creative Commons* rather than full-blown copyright.
- Three, if we insist that our scholars must "publish or perish," we ourselves should "read or quit asking." As seriously as we demand the production of scholarship, we must do our best to promote the consumption of this scholarship. To make this scholarship useful, we will need new collaborative evaluation methods and better search capabilities. To put it simply, we need to find ways to evaluate and value collaborative work in hiring, tenure, and promotional decisions. The quantity of a scholar's print publications is not a sound measure of her true value as a professor.
- Four, and most importantly, if in the course of addressing these contentions we discover that the conventions regulating the production of scholarship are illogical and indeed threatening to destroy the whole system—then we must immediately abandon those rules, and forge new ones to ensure the perpetuity of the system. The point is not merely to interpret scholarly production, but to change it.

The network of university scholarship is in peril. This network enjoys a huge supply of books and articles and an insatiable demand for them, yet the current infrastructure of print publication is not designed to handle this load. Neither libraries nor individuals can

afford to keep this system in operation. Even if university presses or commercial publishers were able and willing to meet the demands of publishing every valid work of scholarship produced in this nation, managing this paper mountain of information would be impossible, to say nothing of the needless and unforgivable destruction of our natural resources such a process would entail. For much the same reason that replacing alternating current with warehouses full of batteries makes no sense, depending on print in the digital age is simply illogical. Reason demands that we spare resources, not squander them. A central argument of this dissertation is that the key factor responsible for this cavalcade of articles and books is an inappropriate concept of scholarship, which conceives of a "good scholar" as a hard-working manufacturer of commodities rather than the provider of an important cultural service. Again, electronic publishing *by itself* will not save scholarship. Electronic publishing, if followed by a paradigm shift in scholarship, will allow it to flourish as never before.

Reforming the dissertation process is an easy way to get the ball rolling. The dissertation plays a vital role in the initiation of most scholars into academic discourse and forms values intended to last a lifetime. Ernest Boyer writes that "it is in graduate education where professional attitudes and values of the professoriate are most firmly shaped; it is here that changes are most urgent if the new scholarship is to become a reality" (68). The dissertation, which Boyer calls the "centerpiece" of graduate education, plays a pervasive role in the formation and evolution of an academic field (74). A major reform of this process may eventually lead to a much greater and further-reaching reform of higher education. Naturally, a discussion about the dissertation process cannot be

separated from a wider discussion of scholarship; it is part of a complex and intricate network. The implications of my argument extend well beyond the dissertation process. However, if a few scholars to re-think some entrenched traditions such as those surrounding the dissertation, a chain reaction might lead to reconstruction of the entire scholarly enterprise in a form more compatible with modern economic and technological developments. Morton Winston argues that "graduate training leading to the Ph.D. […] is the basic way in which disciplinary elites replicate themselves and hold away over the entire academy" (55). According to Winston, "Favored students are invited to join the elite by being touted to other members of the disciplinary elite at other major research universities," but others are told "they will probably make good teachers at lesser institutions" (55). For Winston, the answer to the problem requires focusing more on teaching in the preparation of new scholars. "In addition to a significant research project," writes Winston, "there could be a requirement that graduate students demonstrate that they can prepare and teach three different courses at the undergraduate level" (60). As Winston notes, much change has already taken place in the dissertation process in the sciences. The Council of Graduate Schools reports that whereas research projects in "the sciences and engineering […] are now largely collaborative enterprises," in "the humanities the model of the lone scholar working independently still prevails" (10). As long as print publications trump all else in evaluating professors and scholars, then the "Invisible College" or the "disciplinary elites" will continue to reign supreme. The Internet offers some hope for scholars long excluded from the print discourse controlled

by the elites: "The electronic frontier is the most important battleground in the struggle to reform academic values" (Winston 63).

The dissertation process now plays an important, if underprivileged, part in the formation of American scholars. Considering how much work the typical author puts into crafting a dissertation, it is unforgivable that so few of them are read by anyone but a committee. Many dissertations "see their greatest use collecting dust on library shelves" (Goodchild et al., 3). Paul Parsons writes that fewer than 20% of new books published by university presses are revised dissertations (112). The best-selling dissertation available via UMI only sold 100 copies in 2003 (Crump, "Best-Selling Dissertations"). However, some of the dissertations made freely available online and indexed by the NDLTD have been downloaded over 75,000 times (McMillan 320).

The sacred mission of a dissertation—namely, a scholar's first serious contribution to a discipline—has been abandoned in favor of other, more banal purposes, which can be easily enough discovered with a moment of lucid reflection:

- The dissertation serves as a type of qualifying examination that demonstrates a scholar's *uncompromising* willingness to enter, as a professional, a chosen scholarly field. Writing a monograph is a serious undertaking for even the most seasoned scholars; for a neophyte, it often proves insurmountable and may be the "requirement most often responsible for the failure of qualified students to complete their degrees" (Tronsgard 493). The dissertation thus helps keep down the number of new Ph.D.s by allowing only the most dedicated through the gate.

As many as 30% of doctoral candidates complete their coursework but never complete their dissertations (Goodchild et al., 2).

- The dissertation demonstrates an aspiring scholar's ability to conduct (though not necessarily *contribute to*) research in his or her chosen field. The comprehensive "reviews of the literature" so essential to most Ph.D.s at least show that the author has a grasp of the kind of scholarship valued in the discipline and what is available on that topic.

Dissertations ought to serve as a useful contribution to a field of scholarly inquiry. No one denies this. However, certain conditions have made it difficult for dissertation authors to meet this goal. One is the tendency to find a highly recondite topic which can be considered "original" and will not involve dealing with a mountain of previous research. A dissertation entitled "The Use of the Conjunction 'And' in Chaucer's *Canterbury Tales*" might address issues not previously written about, but does not sound very promising or valuable to many people, even Chaucer specialists. Another problem is that dissertations are seldom published, advertised, or properly distributed. Thus, even a great dissertation might never be read by anyone but a dissertation committee. Finally, "traditional" qualities, like exhaustive literary reviews and external citation, make dissertations difficult to read.

From the perspective of those professors who must serve on a dissertation committee, the process can be rewarding, or, in some contexts, unnecessarily burdensome. The best professors are able to guide authors in selecting interesting and useful topics, offering advice on writing style, and helping them secure a publisher so that

the work is available to other scholars. These professors refuse to treat their candidates "like students," choosing instead to treat them as junior colleagues who have come to them for support and tutelage. A 1992 *Journal of Higher Education* article by three faculty members points out that "the dissertation also reflects on the work of the adviser" (Isaac, Quinlan, Walker 242). A dissertation that is eventually published by a prestigious press earns glory for the adviser as well as the writer. A department with a reputation for published dissertations is a valuable asset to any university.

Not all professors feel it is important for their students to publish their dissertations. These professors, less inclined to such collegiality with their students, may push them to produce dissertations that, while extensively researched, are not written in a form that will be welcomed by a publisher. The Council of Graduate Schools' *Policy Statement* quotes one professor's claim that "the very features that make dissertations unpublishable may be their greatest virtues" (16). The professor's argument is that the dissertation process "may be the one opportunity in a scholar's career for doing detailed and meticulously careful research, analysis, and argument" (16). Clearly these skills are valuable, and few serious scholars would argue that they should be sacrificed for the sake of producing a "more marketable" dissertation. The problem, of course, is the growing dependency of scholarship on commercial publication, a subject I address more fully in my third chapter.

Other faculty members place so much emphasis on "originality" that the student selects a banal and trite subject of little interest to anyone, even if it is well written. According to a 1992 study of some 600 graduate faculty, "independence and originality"

are the most important characteristics of a good dissertation (Isaac, Quinlan, Walker 250). The quest for "originality" can lead students to obscure and ultimately fruitless studies like the aforementioned dissertation on Chaucer's use of conjunctions. Still, even if an author is fortunate enough to have the very best professors on her dissertation committee, there is no guarantee that her work will be well-received by a publisher and may instead languish unnoticed in a microfilm drawer or pay-per-view online database. Though an author of an unpublished dissertation might still benefit from her research, she might feel that the great effort required to write her dissertation was "disproportionate to its value" (Tronsgard 491). The time might have been better spent writing a series of publishable articles, taking extra classes, or interning in a lab or office.

David Tronsgard wrote in a 1963 issue of *The Journal of Higher Education* that the dissertation process had become merely a "rite of passage, a ceremonial suffering" (494). According to Tronsgard, the *only* purpose the dissertation truly serves is to "maintain high standards for the doctoral degree" and thereby allow professors to maintain their "academic respectability" (494). Tronsgard's proposed solution is to allow students to work in groups of six and dropping the requirement altogether for candidates seeking to enter professions. An article published in the same journal two years earlier had called for greater concision in doctoral dissertations—"Certainly," the authors wrote, "almost any dissertation would be much more valuable if it were reduced by half" (99). Henry Silver, the publishing consultant of the American Council of Learned societies, called dissertations the "stepchildren of the publishing world," and sarcastically remarked that "although their contents are frequently useful and in great demand, the demand is

expressed at such a slow rate that publishers cannot afford to publish them" (qtd. in Ellsworth 243).

In its customary form, the dissertation process serves several worthy purposes, but it is doubtful whether a good dissertation is actually good scholarship—if we stipulate that *good scholarship must be widely disseminated and influential to others in the field.* Some critics argue that the entire process seems to serve the interests of those established scholars and administrators committed to the preservation of tradition over excellence—or, as Gary Olson and Julie Drew suggest, those directors who wish to maintain "an unequal power hierarchy of 'masters' an initiates—one that is self-serving at best and unethical at worst" (Olson and Drew 56). Clearly, the dissertation process should be more than academic hazing.

Indeed, if the dissertation were made a true demonstration of an aspiring scholar's ability to research, write, and publish in a field, then scholarly and commercial publishers would not stand almost united in their utter contempt for dissertations and demand such far-reaching revisions to make them fit for publication. Paul Parsons, author of a book written to help scholars get published, writes that

> The word "dissertation" is both appealing and repellant to editors. The word has a mild appeal, in that editors recognize that the eminent scholars of tomorrow are beginning their intellectual pursuits in the form of a dissertation today, and editors want to discover the brightest new minds. But the word often creates a negative reaction. Dissertations are

> considered to be ponderous, overdocumented, and concerned with topics of little interest or significance. (113)

Many scholars agree with Maureen M. Hourigan that the answer to this problem is simply to encourage students to seek out dissertation directors who will let them write their dissertation "as a book," and even give some thought to its marketing potential (80). This approach may lead to more dissertations being published by commercial or university presses, but it is doubtful whether it will really lead to better scholarship.

Despite the "overdocumentation" and comprehensiveness of the "traditional" dissertation, many journal editors, peer reviewers, and professors consider them a doubtful addition to a works cited list. There seems to be little demand for general access to these documents. Instead, both the authors and potential readers of dissertations seem quite content to let the product of a year or more worth of research slowly rot away in the lowest drawer of the deepest basement of a library, perhaps reduced to microform to preserve even that wretched space.

The time has come to change the dissertation process in the humanities. We must spring free from those fetters of tradition that have caused dissertations to be less useful and prestigious than they were in the past. We must scrutinize those conventions that have become outmoded and harmfully restrictive, and create new ones to ensure that authors are allowed to be as innovative and their dissertations procreative. Traditions that have outlived their usefulness and now stifle innovation are not worth keeping and must be cast aside and spurned with the same vehemence that older scholars, long ago, tossed aside the old folk knowledge and religious dogma for the sake of something better and

truer. If we lack the will to think critically of our own values and traditions, how can we ask the same of our students? Scholars must occasionally turn their critical eye towards themselves and their practices, and hold no tradition sacred which interferes with the acquisition and dissemination of that knowledge they hold precious. Scholars must champion, not resist, technological inventions and innovations that might improve the flow of information and better secure the university research network.

The following chapters present a comprehensive and polemical view of the history, present, and future of the dissertation process. The second chapter descends into the past to uncover the original and worthwhile purpose and form of the dissertation, then proposes two alternative futures for the dissertation. The discussion involves a look at subjects as disparate as the manufacture of paper, the establishment of a reliable mail service, and the rise of printing presses. The third chapter is an indictment of intellectual property law, the modern dissertation process, and a determination of whose interests are best served by the status quo. The fourth chapter concerns the *NDLTD* and other network applications which stand to dramatically improve access to scholarship and explore the rationale behind the resistance of these technologies. The last chapter describes the future of scholarship if these barriers are overcome and the scholarly enterprise is allowed to flourish into the 21st century and beyond. The point of this dissertation is not merely to interpret the situation, but to change it.

Chapter Two

The History of Dissertations

The dissertation process is in serious need of reform. It has become more of an exercise than a valid contribution to a field of scholarly inquiry. However, in the past it served a very different function. The historical dissertation varies most strikingly with its modern-day version in two ways: Form and value. This older form deserves a very close and very thorough examination, as do the unpleasant consequences that led to its present state.

The Curious History of the Dissertation

The dissertation as we know it today was imported from the Germans, who had begun to transform the entire academic enterprise to meet the demands of science. Medieval students had been expected to demonstrate their mastery of the canonical texts and age-old arguments of the Scholastics. The typical dissertation was a combination of "opponency, disputations, and lectures," oral forms that helped students clarify their thoughts and defend them against critical attacks by the faculty (Malone 77). These disputations ultimately demonstrated the initiates' readiness to stand as a colleague and involved many oaths to the Church, the community, and the school. Since the ability to engage in this type of formal argument (the dialectic) was the mark of a good scholar, these disputations were not so much a "trial by fire" as a dazzling public demonstration of

a new doctor's skills; a "free advertisement" that assisted the new professor in recruiting new students. The disputation process has been somewhat carried over in the oral dissertation defense required by many graduate schools.

The process by which Medieval students became doctors of theology was quite intricate, consisting of a series of lectures and question and answer sessions. Some of the questions were asked or responded to by bachelors and others by masters. The entire school would be present at these events, which were rightly considered by all to have impressive educational value. The following paragraph, which describes the final phase of the inception process, should give some idea of the complexity of the ritual:

> This whole cycle of ceremonies was concluded at the first lecture of the new master, which was named the "resumption." At this lecture the new doctor of divinity finished his speech in praise of Holy Scripture which he had left uncompleted in his aula and dealt with the second question of the vespers in which he was the respondent. Lastly he returned again to the third question of the four which he had originally chosen to discuss, and with a new respondent proposed and determined it. In this fashion he began his ordinary career as a regent master. (Daly 147)

There are many interesting differences between the Medieval university and the modern research university. Perhaps the most interesting was the less-than-solid distinction between professors and students and the constant questioning (or disputing) of knowledge. Bachelors, masters, and doctors were constantly engaged in "disputation," or dialectical argument concerning a given question (often determined by the students). It

was not unusual for two masters to dispute questions in front of students, who were expected to participate. Though these students greatly valued traditional authorities and spent a great deal of time memorizing works from an established body of knowledge, they advanced by participating in critical arguments and incessant debating. The focus of the Medieval education was not so much on mastering and contributing to a body of knowledge, but mastering techniques which made men knowledge-*able*. Thus, when we hear scholars today state that teaching students to find information is more important than having them master information, we realize they are not advocating something radically new, but rather something old.

The books of the Medieval period also illustrate the open, collaborative approach to knowledge enjoyed by these scholars. Scholars frequently inserted their own commentaries into manuscripts where were often copied along with the original text in subsequent copies. These "glosses" became a critical part of the teaching process. A professor might read a passage from Aristotle, then the glosses, then offer his own interpretation—then this cycle would be repeated, over and over. Jay David Bolter writes that "in some scholarly Medieval codices, the page became a web of text and interpretation, tradition and innovation" (22). Stanley Chodorow writes:

> In the Middle Ages, works of literature—history, theology, law, medicine, and literature in the strict sense—grew and changed from writer to writer. The great glosses on the Bible and on the foundational texts […] were composite works put together from the works of many teachers and scholars. The glosses eventually achieved a standard, or vulgate, state but

> they evolved for a long period before doing so […] What was significant was not who wrote them, but what they contained. (5)

These commentators saw no need to identify themselves as authors. We seem the same phenomenon occurring in the Jewish intellectual tradition with the *Talmud*:

> Within the Jewish tradition, an interpretation by a legal scholar doesn't assume its fullest authority until it becomes anonymous, when the name of the author has been erased and is integrated within a shared heritage. Talmudic scholars constantly cite the advice and comments of the wise men who preceded them, thus rendering the most precious aspect of their thought immortal in a way. Yet paradoxically the sage's greatest accomplishment consists in no longer being cited by name and disappearing as an author, so that his contribution is identified with the immemoriality of the collective tradition. (Pierre Levy 133)

Both Bolter and Levy illustrate here an older conception of scholarship that was essentially "de-authored," that is, texts had an authority quite autonomous from that of their authors. Eventually, the Medieval glosses were separated from the primary texts and published independently.

Though the costs of books were great in Medieval times, in a legal sense they were freer than they are today. The only regulative body in existence before printing was the Stationer's guild, which was controlled by the universities. Books were considered an important public resource and owners of texts were forced to share them when a copy was requested:

> The [university] authorities checked essential works for textual correctness, controlled prices, and required that books be loaned to anyone wishing to make copies or have copies made for them. Thus, it was not possible for anyone owning or producing a text to demand remuneration for making his work available since the system forbade exclusivity. (Bettig 15)

The costs of books were so expensive during these times that very few individuals could own a text. Indeed, M.W. Strasser tells us that a lady in the 15th century purchased a book of homilies for "1 and ¼ tons of wheat, 1 ¼ tons of wheat, and 200 sheep" (10). Since owning books was out of the question for most students, one of the most important parts of a Medieval education was the "lecture," in which teachers read texts aloud to students, who diligently copied the lecturer's words into their notes. University libraries did not really exist until the 18th century, but small book collections were sometimes available to students and faculty of early universities. Most of these books were locked in chests and others were chained to the wall to prevent theft. This practice of chaining books to walls of lecterns continued into the 18th century (Ridder-Symeons, 200). Perhaps not surprisingly, theft has remained a problem for libraries to this day. Now libraries employ advanced technology like magnetic scanners instead of chains to keep students from privatizing public property.

Two advances in communication technology, the printing press and a reliable mail system, changed education and literacy by dramatically improving the speed and coherence of the information network. These precautions are unnecessary with electronic

texts, because they can be downloaded to anyone's computer an infinite number of times; there is no practical reason why access must be limited. An electronic text is "still on the shelf" if a thousand people are reading it simultaneously. However, even though computers eliminate this scarcity, many scholars (and, it seems, all publishers) still wish to act as though scarcity were still a real issue—and have had laws passed to enforce a completely arbitrary form of scarcity.

What caused the dynamic oral system of learning to collapse was the invention and rapid adoption of print. Cheap and reliable printing made it easier to objectify knowledge and instill the belief that knowledge was static and composed of discrete units. Some scholars have argued that the conception of authorship itself was only made possible by the invention of the printing press. Ronald Bettig points out that "printing press is among the first inventions to be exploited by capitalists," and describes how a merchant named Johann Fust ended up with Gutenberg's famous equipment when the latter could not pay back his loans (15). Though authors were long treated as merely another craftsmen involved with book production, the persistent efforts of writers like Charles Dickens and Mark Twain eventually won authors special economic privileges[4].

Another interesting effect of printed books was the rift that formed between authors and readers. Before the invention of the printing press, any scribe could make a copy of a text that would be indistinguishable in form from the original. There was no functional difference between copies produced by different scribes—assuming that both

[4] Though I will say much more on this subject in the next chapter, suffice it to say that copyright law wrings it profit by limiting the public's access to information. This limitation is antithetical to public-minded scholars, who seldom profit from their publications—the limitations imposed by copyright merely make the dissemination of their work more difficult.

were competent. Whereas before a writer's annotations or commentary might appear similar to the writing in the manuscript, hand-written notes juxtaposed with printed text began to look more like vandalism instead of a valuable (or legitimate) contribution to a document, and, of course, these notes would only be available to someone with that particularly copy of a book. Thus, a division appeared between writers and readers that eventually led to the conceptualization of the modern author. What really mattered was what the author had to say. Though later the author was expected to write something "original," Martha Woodmansee writes that "from the Middle Ages right down through the Renaissance, new writing derived its value and authority from its affiliation with the texts that preceded it" (17). The concept of an original author "creating" a unique work is thus relatively new, and does not necessarily represent progress.

The printing press is not the only technological innovation to have left its mark on contemporary scholarship. Jean-Claude Guédon argues that the creation of a reliable mail system had profound effects that we are only now beginning to appreciate. Whereas originally the mail service was typically used only for diplomatic purposes, by the 17th century, civil servants were using it to exchange their thoughts as "men of letters." He writes, "The regular increase in intellectual news being transmitted through the limited postal services was gradually accompanied by comments, evaluations, and judgments that evolved into a full critical mode of expression over the course of a century and a half" (74). All of this discussion eventually culminated into early forms of the academic journals we know today. Robin Peek writes, "As the number of scholars grew larger, private letters became too cumbersome, so the journal became the suitable means to

exchange letters on a broader and more efficient scale" (5). Guédon makes many interesting remarks on this development:

> The paradox is that printing was suddenly used also to diffuse transitory materials—to spread news that was destined to age quickly […] In fact, it required dissociating the act of diffusion from the act of preservation, although the two had come to be closely linked through the early history of printing. It also required moving from the privacy of a letter to the public exposure of print. Finally, it unwittingly extended the privilege of preservation to texts that had not been expected to survive the moment. Even more surprising was the added legitimacy that these kinds of texts gained by being printed. (75)

Print just seemed to magically have more authority than the same material, hand-written and delivered by private letter to other scholars. Increasingly, oral communication, and finally hand-written communication, was losing prestige and credibility as true scholarship. Printed scholarship was now the privileged form of scholarly discourse.

Even though the printing press lowered the cost of books, many members of the public still could not afford to purchase all of the books they needed or desired. The rise of libraries was likely only possible because of Enlightenment-era thinking, which stressed that well-informed citizens were a necessity for the stability and progress of a nation. Libraries could purchase copies of books, share them with citizens, and thus stimulate progress. Siva Vaidhyanathan writes that "librarians should be our heroes" ("Anarchist" 119). According to Vaidhyanathan, a library "is a temple devoted to the

anti-elitist notion that knowledge should be cheap if not free—doors should be open" (119). As the prestige of print rose and the reading public demanded more books, the presses strove to meet the demand—and universities adapted to better accommodate the new technology. Indeed, Hilde de Ridder-Symeons tells us that "everyone dealing in books was a member of the university" (202). One can only imagine what the fate of universities would have been, had they rejected or ignored the potential of the printing press.

Printing and Prestige in the Universities

Still, the university's adoption of print technology was not an overnight event. Charles E. McClelland argues that only "by the mid-eighteenth century, some universities had begun to place a premium on publication as such by professors" (171). According to McClelland, "By about 1850, various conditions had combined to make the publication of research findings, and the ongoing process of research that led to new discoveries, a prerequisite for the successful professor" (171). McClelland thinks this was not only because of rising standards, but a more fundamental "idealistic element, a high valuation assigned to research as such" (171). He argues that this element sprang from the Romanticism, which stresses the uniqueness of individuals and the "originality" of good writing.

The early scholarly journals that now play such an important role in acquiring tenure and securing promotion began in 1665 with the publication of the *Philosophical Transactions of the Royal Society of London* (Peek 5). According to Peek, the basic

function of this and other early journals was simply to provide a more convenient way to exchange information that had formerly been disseminated via private letters. The papers in these journals were considered works-in-progress that would eventually find their way into monograph form. Thus, very early scholarship (in the form of mailed private letters) was rather like the emails scholars might send to one another today (perhaps via a listserv). Eventually, when the bulk of email reaches unmanageable proportions, the group might start using a bulletin board or online forum (which was the function served by early journals like the Royal Society of London's). Here, the intense discussions of eager scholars might eventually find their way into final published form, probably in the form of a carefully edited monograph for the benefit of the public.

What is interesting to note is that the scholarship takes place well before the actual print publication of a work. As Jean Guédon notes, "The greatest paradox of printed scholarly journals is that they act more like archival and legitimizing tools than like communication tools" (79). This paradox has become increasingly vivid as we have moved into the electronic age. A book or journal article that surfaces a year or more after the author's submission (the standard turnaround time) may seem obsolete by the time it appears on the library shelf[5]. Print scholarship is rather like the "fossil record" of a field; that is, it presents a picture of the past and never the "cutting edge" of a field. The audience for scholarly monographs and journal article seems to be hiring or tenure committees who need quantifiable evidence of a scholar's "productivity" rather than the members of a field. However, a scholar's fifteen-minute phone call to a colleague in

[5] This is painfully obvious in computer-related print scholarship, which often appears years after the technologies they concern are no longer available on the market.

Britain might advance a field of knowledge light-years further than a journal article or a three-hundred page monograph. A team of scientists might simply email each other with the results of their studies or post them to a website rather than rely on cumbersome print publication. The quantity of a scholar's print publications as an indicator of true scholarly productivity is insufficient and even misleading. Indeed, a scientist's taking time away from true research and professional discussion with colleagues to write a book or article for print publication seems quite wasteful.

The Invisible College and the Royal Society

Robert Boyle's "Invisible College," which I briefly mentioned in the first chapter, plays an interesting role in the history of scholarship. Boyle's "Invisible College" was a small group of science enthusiasts who began meeting in 1645 for lunch and scientific discussion. Though everyone but Boyle was university trained, the purpose of the "Invisible College" was to encourage pursuits that would not be welcome (or acceptable) in the colleges of the day. Boyle writes that the group "barred all Discourses of Divinity, of State-Affairs, and of News (other than what concern'd our business of Philosophy" (Qtd. in Stimson 37). By "philosophy," Boyle was referring specifically to what would later be known as natural philosophy—physics, anatomy, mechanics, and so on. Boyle's group was specifically opposed to Scholasticism, which emphasized ancient authorities like Aristotle and did not value experimental science. Later members of this group would form the Royal Society, which received its official charter from King Charles in 1662.

In 1665, the Society issued its first journal, the *Philosophical Transactions*, which was the first scientific journal published in English (Stimson 65). The Society and its journal soon replaced the universities as the most authoritative source for scientific knowledge. Thomas Hobbes wrote in 1679 that the study of natural philosophy was "remov'd from Oxford and Cambridge to Gresham-College in London, and to be learn'd out of their *Gazets*" (Purver 73). The emphasis on disputation was being superseded by experimental science. In a blistering attack in his *Essay Concerning Human Understanding,* John Locke writes

> Vague and insignificant forms of speech, and abuse of language, have so long passed for mysteries of science; and hard and misapplied words, with little or no meaning, have, by prescription, such a right to be mistaken for deep learning and height of speculation, that it will not be easy to persuade either those who speak or those who hear them, that they are but the covers of ignorance, and hindrance of true knowledge. (Book 1A)

For Locke and many others, the traditional authorities could no longer suffice. Francis Bacon's 1620 *Novum Organum* privileged induction over deduction and rejected syllogistic reason (Klein, "Francis").

In short, the Royal Society provided a haven for scientific discussion that stood autonomous from universities—which held a slavish devotion to Aristotle and other traditional authorities. The Society also worked to globalize; it made great efforts to translate scientific works and to make their own works as easy as possible to translate accurately. Furthermore, it had made every effort to disseminate the *Philosophical*

Transactions far and wide. The journal was edited by Henry Oldenburg, one of the secretaries of the Society. Oldenburg helped to earn some profits selling the journal, "founded and financed by him as a means of personal profit if possible, but with the authorization of the society to back him" (Stimson 66). Almost immediately, the journal became a place for scientists to gain the notoriety of being the first to publish new discoveries, and quarrels and accusations of plagiarism were plentiful. Stimson reports that "writers took what they wanted from other men's books an there were many complaints about the stealing of men's ideas and inventions" (66). Even Boyle asked Oldenburg that he keep his manuscripts from "the eye of a philosophical robber" (Stimson 66). Disposed as they were towards generous ends benefiting not just their society, nor their country, but the entire world, the members of the Royal Society nevertheless felt very strongly that the credit for discoveries ought to be given to those who first reported them and were at times suspicious of their fellows. This desire to "be the first" and to receive personal credit for making discoveries marked an important turning point from Medieval times, when writers seldom identified themselves and attributed their insights only to God.

Changes in Higher Education

Not surprisingly, higher education began to change as universities gradually reformed their curriculums to better accommodate the new emphasis on empirical research. McClelland writes that the Germans "were the first to fuse teaching with research functions and thereby to create the very model of the university university" (2).

German scholars became more concerned with producing new empirical knowledge rather than engaging in the often circular formal dialectical argumentation so central to the Medieval universities. The German scholars, influenced by the logical positivism of the 19th century, felt that students ought to conduct experiments and make a real contribution to the rapidly expanding field of scientific inquiry. There was a great deal of work to be done in all scientific fields, and the Germans quickly enlisted the assistance of their graduating students in performing this critical labor. This was a time in science when a single scientist working in a private laboratory could indeed conduct valuable and far-reaching research; students were expected to strive to discover something new and useful. The dissertation, as a result of such inquiries, was valuable precisely because it would make a valid and useful contribution to scientific knowledge. In the German's view, a dissertation ought to conform to a model based on controlled experiment and empirical deduction and constitute what we might call an extensive laboratory report. The traditional chapters of a dissertation, including "Methodology," "Results/Findings," and "Analysis and Interpretation of the Findings" suggest how closely the dissertation structure was linked with scientific experiments.[6] The Germans began requiring students to produce written dissertations before the end of the 18th century (Malone 79). G. Stanley Hall, William Watts Folwell, James B. Agnell, Andrew White, Daniel Coit Gilman, and Charles W. Eliot studied at German universities and then rose to high administrative positions at American institutions (Lucas 171). They adopted many of the qualities so admired in the German model, including the emphasis research and

[6] See Jude Edminster's dissertation, *The Diffusion of New Media Scholarship.*

publication. Learned societies like the American Chemical Society and the Modern Language Association began to form and publish journals. Johns Hopkins University founded the *American Journal of Mathematics* in 1877, soon followed by journals in chemistry, physiology, psychology, and philology (Rudolph 405).

The value of scholarship depends on its accessibility to other scholars. Even today, many scientists would agree that proper scientific research is valuable regardless of its subject; a lengthy series of observations and experiments concerning the breeding habits of a rare African beetle might lead to great insights, and the data collected from other projects might very well lead to a radical break in the way scientists account for all life on the planet. The encyclopedic or "structuralist" approach to knowledge, which in many ways still dominates our thinking about scholarship, eventually came under attack in the late 1970s by Post-Structuralist thinkers, who challenged many of the underlying assertions of scientific reasoning and even notions of authorship, originality, and the neutrality of so-called objective knowledge. Though the Post-Structuralist movement had quite an influence on scholarship in the humanities, the works of Roland Barthes, Francois Lyotard, Jacques Derrida, and Michel Foucault seem to have effected little to no change in administrative regulations regarding scholarly production and dissemination; as Lisa Ede and Andrea Lunsford write, "We scholars in English studies, it appears, are often more comfortable theorizing about subjectivity, agency, and authorship than we are attempting to enact alternatives to conventional assumptions and practices" (356). To put it simply, many scholars, including those who claim writing as their special field of critical study, measure the prominence of even the Post-Structuralists in terms of their

"seminal works" and the frequency with which these works are cited in other works of scholarship. Vaidhyanathan believes the theoretical arguments about authorship may distract scholars at a critical time in intellectual history: "We can deconstruct the author for six more decades and still fail to prevent the impending concentration of the content, ownership, control, and delivery of literature, music, and data" ("Copyrights" 10). For Vaidhyanathan, the important task facing scholars is informing the public about the dangers to culture posed by too much vertical integration in the cultural marketplace.

Even if we do not wish to embrace Post-Structuralist criticisms of empiricism, we must notice that new developments in science make the old form of the dissertation untenable. Most significantly, now many major scientific projects are not undertaken by individuals working in small private laboratories, but huge consortiums of thousands of scientists often working together in labs all over the world—and, indeed, even in space. To succeed as a scientist in such situations, a student must learn to successfully collaborate and participate in huge, sprawling projects that often expand beyond the confines of a nation. The ability of an individual student to produce a book-length treatment is not nearly as important to contemporary scientific practice as her ability to collaborate.

The dissertation as it is widely understood today sharply contrasts in form and purpose from earlier forms. The idea of a dissertation as a book-length, exhaustive study of written works that is somehow nevertheless to emerge as "original" is the product of relatively recent thinking that stems from two sources: market forces (intellectual property law), and the empiricism of scientists. To say that the typical modern

dissertation, with its cumbersome, unreadable language, bulky literary review, and hopelessly recondite subject matter is "traditional" is simply to disregard history. Furthermore, the conception of scholarship as the mass production of commodities in the forms of scholarly books and articles is both historical and detrimental to the future of the scholarly enterprise. In short, the era of the dissertation as a single-authored piece of "original" scholarship is nearing its end.

Disseminating Dissertations

Before the rise of electronic writing technology, print technology served a very necessary purpose—it was the most efficient means of disseminating and archiving scholarship. Regardless of the great expense it meant for new scholars, universities in Europe and America required students to publish their theses and dissertations throughout the nineteenth century (Parsons 12). John Hopkins University, under the leadership of Daniel Coit Gilman, required students instituted a requirement in 1884 that students publish 150 copies of their work at their own expense (Goodchild and Miller, 23). In 1888, Johns Hopkins and other universities adopted a requirement that all dissertations must be published, and founded university presses to facilitate the process (Olson and Drew 58).

The publication requirement, which often came at the students' expense, was the surest way of disseminating the results of graduate research. Eventually, however, American universities quietly dropped this requirement: "Manufacturing costs increased for authors, while the number of manuscripts became too great and their use too little to

justify institutions' binding, shelving, and cataloguing them" (Parsons 111). According to Paul Parsons, the publication requirement was eventually lifted in America because of the high costs to authors "while the number of manuscripts became too great and their use too little to justify institutions' binding, shelving, and cataloguing them" (111), and, in 1947, Columbia University became the last major university to end the requirement (Drew and Olson 58). It is probably also likely that as professors were expected to publish more frequently, their research was deemed more worthy of publication than that of a new and "unproven" scholar—"If editors would agree to publish only the very best of the articles submitted as revised dissertations," wrote Ralph Ellsworth in a 1958 *Journal of Higher Education*, "space could be made available for more prompt publication of articles written by *mature* scholars" (243, emphasis mine). What was needed was a way to make dissertations "available" without having them compete directly with more "important" works at the press or on the library shelf. The universities and libraries finally found an economically viable solution to this problem: UMI, or University Microfilms, which, as its name implies, saved everyone time and money by reducing print dissertations to microfilm. It seems that by this point, dissertations had lost the inherent value to other scholars they had enjoyed in earlier times. It was widely acknowledged that microforms were less convenient and accessible than print copies; the major advantage was archival. What typically ended up on microforms were back issues of periodicals (especially newspapers) that were assumed to lose relevance and most of their value with age. Storing newspapers on microfilms made great sense—the cheap paper used to make newspapers erodes quickly and is difficult to preserve. Dissertations,

however, were typically bound and printed on high-quality paper, with double-spaced printing on only one side of the pages. They were heavy, bulky, and expensive to print and distribute and took up a lot of space in libraries.

Space did not really become a problem for librarians until the 18th century. Previous to this time, the scarcity of books had led policy makers to force publishers to donate books to libraries. For instance, the Copyright Act of 1709 (the famous Statute of Anne) required presses to deposit nine copies with various libraries, though this policy was not strictly enforced (Ridder-Symeons 198). Even still, the libraries were quickly swelling to the bursting point, and architects were called in to design new systems of bookcases and galleries. If space had become a problem in the 18th century, one can easily imagine why shelf space had become a crisis in the 20th. Something had to give, and dissertations and theses were the first casualties. The answer came in 1938, when Eugene Power offered universities the services of University Microfilms, later known as UMI. Power offered to take the responsibility from overburdened universities of publishing, sorting, storing, and distributing dissertations—all for a reasonable $20 fee per dissertation (Ellsworth 241). The only catch was that the company would forbid the universities to thereafter distribute bound volumes of the dissertations that UMI made available as microform (Ellsworth 241).

From a storage viewpoint, the microfilm solution was a good one. A dissertation on microfilm took up much less space than it would as a printed book, and the costs were dramatically reduced. However, there were still problems that could not be easily overlooked. For one, access to the microfilms requires a device called a microfilm reader,

which few scholars could or cared to own. Therefore, scholars were required to access materials from one central location (usually the library). Another problem was with standards—academic libraries were often forced to purchase equipment for "both fiche and film as well as micro-opaques and ultrafiche" (Dranov 80). A 1976 study called *Microfilm: The Librarians' View, 1976-77* identified a host of other problems—defective microforms, shoddy reading equipment that frequently broke down, poor documentation, and substantial user resistance. The general consensus was, "No one really likes to use microfilm" (86). The major user complaint was that "reading microforms is hard on the eyes," a complaint that echoes contemporary complaints about reading electronic text on a monitor (93).

Some dissertations were picked up by commercial or university press publishers and made available as books; a prejudice soon arose about the credibility of "unpublished dissertations." Ultimately, however, what seems more significant is that while more and more dissertations were banished to microfilm, journals and other scholarly books—and the ever-profitable textbook—remained in print. Microfilm was not seen as superior to print publication; it was merely a cheaper substitute. The fact that universities were willing to accept this substitute for dissertation publication says something about their attitude towards the genre[7].

One would think that given the technological advancements in electronic publishing, dissertations should be more publicly available than ever before. After all, it costs only slightly more to make an electronic dissertation available online as it does to

[7] Though many American universities still require the student to submit at least one bound copy for preservation in the library or department, these bound editions are unlikely to circulate widely afterwards.

store it in a database. However, concerns about "intellectual property" laws have done much to stifle the distribution of these works. John L. Eaton writes,

> It is true that most dissertations are available through interlibrary loan when the single university that houses the document is cooperative, which many are. Or they can be purchased from UMI for $30-$60 per copy. But, does this mean they are truly public? Are they, as Merriam-Webster defines public: 1a: Exposed to general view? And which publics are they made public to? (2)

Eaton, a co-founder of the *Networked Digital Library of Theses and Dissertations,* or the NDLTD, believes that dissertations are not as freely available as our modern computer and networking technology allow them to be. Though I will return to this topic in Chapter Four, suffice it to say here that commercial publishers always already have a conflict of interest with scholars seeking to make their work as available as possible, since earning that profit requires *excluding* those unable or unwilling to pay for access.

Finally, a point that must be made here is that while the Internet *enables* cheap publication, accessibility, and collaboration, commercial interests have found that law and code can be brought to bear on making the Internet more suitable for traditional commerce—at the expense of its original mission to provide free, open communication among researchers[8]. The most effective regulation is at the software level; commercial

[8] It is frequently pointed out that the Internet, or more accurately its predecessor, the ARPANET, were funded by DARPA, the research agency of the U.S. Department of Defense. For much the same reason that the Roman military found it useful to build and maintain an excellent system of roads to improve its physical mobility, DARPA felt that building and maintaining an excellent communication system would greatly improve the U.S. military's research and development capability. Incidental to both the Roman's road-building and DARPA's formation of computer networks is the immense value offered to civilians who

interests hope to monopolize existing software and restrict the development of any programs that threaten to thwart their restriction mechanisms. The culture industry has gone to great lengths and expense to strengthen its grip on the Internet because so many people enjoy access and are willing to share their software and data with others. In the early days of computers and networks, computers were simply too expensive and gigantic for private ownership. Although sensible precautions were taken to prevent unauthorized access to the computers and their punch cards, software was often freely copied and shared among other programmers—much like books in the ages before the printing press made book ownership feasible for the middle classes. Robert L. Glass, a programmer at Aerojet-General in Sacramento, California, remarks that during the sixties "software was, incredibly, free!" (15). According to Glass, "Hardware vendors gave away systems software because they could not sell their hardware without it" (15). Stallman reports that as late as 1970, he received the PDP-11 cross assembler for the PDP-10 from DEC just by asking—it was not copyrighted (Stallman, RE: Help). IBM's scientific user group SHARE offered entire catalogs of free software, routines, and functions (Glass 16). Eventually, when computers became cheap enough for most people to own and efforts were soon made to create an artificially scarcity in software for the sake of building a lucrative new market As early as 1976, Bill Gates had written and copyrighted an operating system for the Altair computer kit and circulated a letter accusing hobbyists of "stealing software" (Gates, "Open Letter"). As more and more people could benefit from access to software, the more potential there was to make a profit controlling and selling

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can use them for non-military purposes. After the initial development of roads and the Internet, it seems incidental that a Roman legion could use the roads as well as a merchant, or that a nuclear weapons

it. We could analogize this as follows: Books are to the Printing Press what Software is to the Personal Computer. In both cases, law and fiction are required to make a convincing case that the book or program in question is "original," the product of individual genius, and best defined as a discrete object in space—a commodity to be bought and sold like any other product.

The Networked Digital Library of Theses and Dissertations

The NDLTD promises to greatly enhance the contemporary dissertation process by making dissertations not only more easily accessible, but allowing for greater innovation. The brainchild of Edward Fox, John Eaton, and Gail McMillan, the NDLTLD started taking shape in the early 90s after Gary Hooper, Virginia Tech's Dean, agreed to finance development and has grown significantly since. The goals of the project are

- for graduate students to learn about electronic publishing and digital libraries, applying that knowledge as they engage in their research and build and submit their own ETD
- for universities to learn about digital libraries, as they collect, catalog, archive, and make ETDs accessible to scholars worldwide
- for universities in the Southeast and beyond to learn how to unlock the potential of their intellectual property and productions
- for graduate education to improve through more effective sharing, and

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engineer could send an email as easily as a teacher.

- for technology and knowledge sharing to speed up, as graduate research results become more readily and more completely available (NDLTD, "History").

The project to encourage the creation, distribution, and cataloguing of ETDs, or Electronic Theses and Dissertations, has been reasonably successful. Hussein Suleman writes that "from a few dozen at Virginia Tech in 1996, to 4328 ETDs at 21 institutions in March 2000, we accounted for a total of 7628 ETDs at 25 member institutions in July 2001" (51). Many of these ETDs are produced by scholars in other countries; the Union Catalog Project is an effort to "make these individual collections appear as one seamless digital library of ETDs" (Suleman 73).

Cataloguing all of these theses and dissertations is perhaps more important than publishing them online. Albert-Laszlo Barabasi writes in *The New Science of Networks* that the Web really does allow *anyone* to publish his views. The problem is, "Faced with a billion documents, if you post information on the Web, will anybody notice it?" (57). According to Barabasi, "Pages linked by only one or two other documents do not exist. It is almost impossible to find them" (58). While many novices worry that a document they publish on a university server will be available for the whole world to see, the reality is that it is very unlikely that anyone will ever see it. Search engines like *Google* rank pages depending on how many other pages link to them; the vast majority of websites attract little interest. The NDLTD might be thought of as a *Yellow Pages* of theses and dissertations; a way to freely advertise an ETD so that other scholars can find and make use of it. Barabasi refers to sites like the NDLTD as "hubs," or big websites that steer web surfers to smaller sites.

Janice Walker and Joseph Moxley write that "thanks to the NDLTD, graduate students can realistically expect their research to attract thousands, even millions, of readers" (114). According to Walker and Moxley, the Virginia Tech digital collection received 2,173,420 requests for ETDs in 2000-2001 (114). The increased exposure and use of theses and dissertations also brings benefits to universities. Edward Fox writes, "Through the NDLTD, every university can publish the works of its graduate students with minimal investment. This should increase university prestige and interest outsiders in the research work undertaken" (36). If the public is assured that universities are producing and making useful research available, they may be more willing to increase their funding.

Considering all the benefits and reasonable expense of setting up an ETD program, one might think ETD programs would already exist all across the United States. However, while enthusiasm for the NDLTD is great in other countries, Walker and Moxley remark that American universities have been slow to implement ETD initiatives. They cite confusion about authoring platforms, limited resources and training, and "resistance from both graduate faculty and graduate students" as factors. I will discuss these and other reasons for resistance in Chapter Four.

I would like to reflect a moment on the NDLTD's goals and how they compare to the hacker ethics described in Chapter One. Two general themes emerge from these goals: One, students and universities should learn about ETDs themselves. The hacker's insistence that one "yield to the Hands-On Imperative!" finds a parallel here. Students are encouraged to *apply their knowledge of electronic publishing and digital libraries as they*

engage in their research. The point is that students should take charge of the electronic publication of their document and find ways to take advantage of the features of online environments. In other words, students should not think of the ETD process as something done for them after the payment of fees, which is more or less UMI's process, but rather as a process in which they play an integral role.

Another of the hacker ethics that comes into play here is that all information should be free. The NDLTD goals speak of "unlocking the potential of their intellectual property" and the benefits of knowledge sharing (NDLTD, "History"). When the NDLTD goals speak of improving graduate education by freely sharing information, they seem to be echoing Steven Levy's argument about free access to code: "Instead of everybody writing his own version of the same program, the best version would be available to everyone, and everyone would be free to delve into the code and improve on that" (Levy 28). This thought can be carried over to ETDs as follows: Instead of everyone writing his or her own "unique" thesis or dissertation, an author could find the best ongoing projects and contribute to them. It seems likely that in a future where ETDs were freely shared and where students were encouraged to innovate, collaboration would naturally follow. This type of collaboration with other aspiring members of a field would very likely offer students a powerful and flexible learning environment—an environment far more conducive to developing professional skills than the artificial and estranged environment of the traditional single-authored dissertation.

We see from the history of the dissertation process and scholarship that more has changed than simply technology. Scholarship can be freer, more dynamic, and more open to participation than it became after the introduction of print technology. It is now easier for the average citizen (or scholar) to create, copy, modify, and distribute information, but laws and customs often prevent her from doing so. Print technology brought down the cost of books until the middle class could afford to own them. This created a new market, and book publishers sought the help of the state to regulate this market and make it more profitable. These developments eventually led to the belief that authors were creators of original and unique works that were autonomous from each other. In other words, a book is an object that can be manufactured and sold like any other commodity. It is unlikely that the modern concept of authorship would ever have formed without the economic situation brought about by printing technology. Eventually, a hierarchy formed between the publisher-endorsed author and the consuming public; a hierarchy that has carried over to the university and now separates the "active" professor from the "deadwood." Electronic technology has now removed the barriers that made such a division desirable, and older notions of collaborative authorship and a privileging of the text over its authors is returning to the fore.

The best organized and effective form of resistance to these changes is the culture industry—which hopes to leverage its considerable legislative influence to maintain the status quo. They have succeeded in extending and increasing the force of a body of laws collectively referred to as "intellectual property." These laws are intended to replace the physical scarcity of the print era with a purely rhetorical scarcity imposed by code and

enforced by law. It is clear that the oligarchs of the culture industry will not abdicate their power peacefully.

Chapter Three

Ownership and Oligarchs

Last January, I was jogging to the campus gym when a man in a suit approached me waving a small green book. The man was a Gideon, an international association of men dedicated to distributing free bibles. According to the Gideon's official website[9], these men are able to distribute "one million copies of the Word of God […] every seven days, or 112 per minute." This is clearly no small accomplishment for a non-profit organization funded purely by contributions from pastors and churches. The efficiency and economy with which printers have been able to reduce the Gideon's New Testament is also impressive. According to Gary Richardson, a special assistant to the director of Gideons International, the cost of printing and distributing a single Bible was a mere $1.31 ("RE: Cost").

The printing of bibles played a well-known role in the history and technological development of the printing press. Though the first printed Bible was Gutenberg's famous Latin version, Martin Luther's efforts to translate the Bible into the vernacular and use the printing press to get it into the hands of his followers is a paradigmatic example of how print can topple governments and change the world as we know it. Far from trying to exclude or prevent public access to the Scriptures, Luther, like the modern Gideons, have made a determined effort to distribute them everywhere.

[9] The website is located at http://www.gideons.org/

After politely declining the offer of the Gideons' free Bible (I already have several), I thought about why Gideon International is so determined to give away these books. The answer seems too obvious: They want to get their message out. Perhaps someone would, out of curiosity or desperation, take time to read the small green book and feel motivated to join a Christian church and devote his life to Christ's teachings. Or, he might toss the book in a drawer or possibly even the trash and promptly forget about it.

One fact, however, is certain: Information is only as influential as it is accessible. The reason why the Bible has continued to have such a long-lasting and powerful influence on our way of life is that its foundational texts are ubiquitous and most Christians are required by their faith to read and share them. Anyone who does not already own a copy of the Bible can get one with remarkable ease. Indeed, many Christians would gladly give their own store-bought copy of a Bible to someone expressing such interest: The book of Mark tells us that "God has commanded us to 'Go ye all into the world and preach the gospel to every creature'" (Mark 16:15). The doctrine teaches that a Christian ought to acquiesce to anyone else's desire for knowledge of his God.

It's hard to imagine how different the world would be today if Christ's teachings were copyrighted, his ideas patented, and the whole affair carefully controlled and regulated by a commercial corporation. The nearest approximation to such a phenomenon I can locate is Scientology, a secretive religion[10] based on the copyrighted writings of L.

[10] There is some contention over whether Scientology is truly a religion. It is officially recognized as a religion in the United States, but Australia and a few other nations have refused to recognize it.

Ron Hubbard. While Scientology has certainly gained a large body of followers, it is doubtful whether it will ever seriously compete with Christianity. Compared to the Bible, L. Ron Hubbard's *Dianetics* has reached an infinitesimal number of readers. What if Luther's Bible had carried this warning on the first page:

> All rights reserved. No part of this book may be reproduced, stored in a retrieval system or transmitted in any form or by any means, without the prior written permission of the publisher, except in the case of brief quotations embodied in critical articles or reviews.

Would such restrictions, imposed and rigidly enforced for the sake of profits and control, have allowed Protestantism to flourish as it has? While Christians are generally encouraged to share their Bibles and information with anyone who will listen, a practice called "witnessing," Scientologists require a long and expensive series of trials before members can gain access into the Church's foundational texts and beliefs. Even the Scientologists website contains a copyright notice and an "All Rights Reserved," and the church is well-known for litigating against other entities who use the Scientologist's "intellectual property" without their permission—which is seldom, if ever, granted.

Intellectual Feudalism

We can see from these striking examples that ideas and expressions that are freely and eagerly distributed by devoted followers are far more influential than those limited by private concerns for profit or control. For someone truly desiring to have a real influence on the world, developing and distributing her ideas freely is the surest route to

success. The cost of giving one's rights to a publisher is a severe lessening of influence. Advertisers know this fact well; never have I been asked to pay for an advertisement, but have rather gone great lengths to avoid their constant bombardment. Perhaps it is time for more scholars to come to the same realization: Free information is free to reach more readers and thus has greater potential to really make a difference.

Comparing scholarly works or dissertations to Bibles and other religious texts may seem absurd. After all, a dissertation is not meant to establish a religion but, in the best of all possible outcomes, to change or enhance the way other scholars think about a particular subject. Ambitious dissertation authors may want to change the world, but they seldom pretend to do so by appealing directly to the public. Instead, their writing is often only comprehensible and accessible by scholars in a narrow discipline. Though dissertations archived and made available by UMI are more accessible than the printed versions collecting dust in a university library, the NDLTD promises to make them even more available and useful. Even though it is doubtful whether the public could fully understand "dissertationese" or the specialized jargon which features so prominently in scholarly discourse, popularizers would likely emerge to make interesting or particularly useful information more understandable. In any case, perhaps the added availability of such works might compel the authors to write better prose.

Though the Internet offers the public better access to information than was ever before possible, private interests seek to strip this resource of its riches and return the "information economy" to a pay-per-access model. Corporations have also penetrated universities and attempted to apply the same strictures on public university research that

they have already placed on their own research and development departments—indeed, one might argue that corporations have "out-sourced" their research and development to public universities, though they refuse to honor the long-standing tradition of those universities to freely share their results with other scientists and the public. How has the corporatization of public universities impaired science and research? How have private interests managed not only to channel the university's gifts to the public into their own pockets, but effectively control research and inhibit the scientific process?

For several decades, professors and cultural critics have raised concerns about the intrusion of corporate and private interests into public universities. When people hear about "the corporatization of the university," they may think of its most visible form: The appearance of new commercial entities where none had existed before. Though alarming to some, the arrival of a *Starbucks* or *Burger King* on a public university campus seems mostly benign; the students benefit by having more choices for coffee or food, and the campus benefits by collecting fees and a share of the corporation's profits. The University of South Florida expects to receive over 7.5 million dollars over the next five years from Aramark, the food company responsible for a new Burger King and Starbucks on the campus (A&P Council). The Administrative and Professional Council report also mentions the new Starbucks that opened in the library: "The Library was commended for their gracious reception of the café. It adds a real sense of ambience to the Library." (A&P Council). Someone making the argument that the presence of a *Starbucks* on campus was severely inhibiting scholarship *as such* would struggle to be taken seriously, even though the public space set aside for these private enterprises is clearly an instance

of "privatizing the commons," or granting a private interest exclusive rights to a share of public property. Nevertheless, public outcries, either from faculty or students, are rare. Indeed, most professors would likely point out that these entities *enable* scholarship by compensating for some of the funds lost in the latest wave of budget cuts, and, besides, the coffee is excellent.

A less visible corporate intrusion, however, does inhibit scholarship and learning and should be taken seriously by all. Indeed, it represents a violation of the fundamental principles of the public university and is arguably responsible for the budget cuts that have forced administrators to turn to private interests in the first place. I am referring to the privatization of research and scholarly publications by commercial publishers, corporations, and the universities themselves. Henry Steck compares the corporate intruders to the aliens in the sci-fi classic *Invasion of the Body Snatchers*, in which aliens replace real human beings with amicable copies (68). A case in point is the DuPont Corporation and its CreLox genetic technology. DuPont required all universities using this important technology to sign a license that gave DuPont all rights in inventions developed with its technology and forbade researchers to share materials with any university that had not also signed the agreement (McSherry 155). Only after the National Institutes of Health, Harvard University, and the University of California refused to sign and raised a protest did DuPont finally back off (McSherry 155).

These private interests have made it common practice to apply copyright, patent, and non-disclosure agreements to documents that were, in better times, free and open to all. One need only look at the business practices of Reed Elsevier, the infamous publisher

of so many academic journals. Whereas the scholars and often the editors of these journals are unpaid—they are only interested in sharing the results of their research with other scholars—Elsevier levies a heavy toll on access to their journals, whether they publish them in print or electronic form. The *Wall Street Journal* reported that Elsevier had made a net profit of $571.5 million in 2005 alone ("Reed Elsevier" 1). Furthermore, Elsevier strictly applies the rights granted to it by copyright law to inhibit others from making these works freely available online. Elsevier's *Science Direct* website, which makes countless articles from their journals available for a pay-per-article fee, claims on its "Terms and Conditions" page that "You may not copy, display, distribute, modify, publish, reproduce, store, transmit, create derivative works from, or sell or license all or any part of the Content, products or services obtained from this Site in any medium to anyone" (Elsevier, "Terms").

In 1993, Sandoz, a giant Swiss pharmaceutical company, made a potentially lucrative deal with the Scripps Research Institute. Sandoz agreed to pay Scripps thirty million a year for ten years in return for an exclusive licensing agreement for any future discoveries at Scripps. This agreement aroused the ire of Bernadine P. Healy, director of the National Institutes of Health, and Representative Ron Wyden of Oregon, who bitterly resented such behavior from a nonprofit research organization that receives seventy million a year from taxpayer funds. Wyden's fear was that "other major U.S. organizations would seek pharmaceutical companies as financial 'sugar daddies'" (Rosenblatt 2). Perhaps a more alarming example occurred in 1998, when two academic physicians wrote highly negative commentary about an article published in *The New*

England Journal of Medicine that reported the dangers of the weight-loss drugs called fen-phen. The critical remarks helped to discredit and downplay the study, but later the editors discovered that the negative commentaries were from paid consultants of companies that manufacture the drugs in question. Sheldon Krimsky, a Tufts University urban and environmental policy professor told the *Chronicle of Higher Education* that "It's no longer safe to assume that academic scientists are 'disinterested'" (Blumenstyk, A41). Some journals, such as *The Journal of Marketing,* do not require authors to disclose conflicts of interest even when such conflicts may pose significant threads to public safety. A professor working as a paid consultant for a tobacco firm could publish articles downplaying the effects of tobacco advertising without ever having to disclose her connections to the industry (Blumenstyk, A41).

Other scientists are lured by the Trojan Horse of corporate grants to conduct research that will never be shared with the public, even when significant dangers are involved. Nancy Oliviera, a researcher at the University of Toronto, was fired when she published negative results in the *New England Journal of Medicine* despite having signed a non-disclosure agreement with a powerful pharmaceutical company. "I will never ever again accept drug company money that is not clearly and completely free of any secrecy clauses whatsoever," said Oliviera after faculty groups and health experts were able to pressure her hospital into reinstating her (Hotz 1). David Kern lost his position at a hospital after alerting the U.S. Center for Disease Control about a deadly new lung disease showing up among workers at a nylon-flocking plant. The company had a trade secrecy agreement which they claimed Kern had violated when he alerted the center

(Hotz 1). These examples illustrate why so many prominent medical researchers are concerned about the rising percentage of research being funded by private corporations. In 1996, such corporations provided $1.5 billion to university researchers—yet, unlike federal grants, these agreements may have required nondisclosure agreements to protect the corporations' profits (Navarro 22). Nobel laureate David Baltimore told reporters from the *Los Angeles Times* that "the problem these days is that commercial organizations try to attach very severe restrictions on our ability to function in an open manner" (Hotz 1). Baltimore calls such openness "one of the core values that lead to great science" (Hotz 1). Vannevar Bush, an engineer widely credited as the father of hypertext, wrote in his groundbreaking book *Science: The Endless Frontier* that "industry is generally inhibited by preconceived goals, by its own clearly defined standards, and by the constant pressure of commercial necessity" (19). For Bush, public universities were valuable precisely because they were autonomous from industry. It is likely that as federal funds are increasingly supplemented and replaced by grants from private corporations, the type of basic research so valued by Bush will decrease and eventually cease altogether.

In the same times when communication technology could make scholarship freer and more accessible than ever before in history, these corrupting influences have created a bottleneck on the scholarly network. Harvard and Cornell have already cancelled hundreds of subscriptions of Elsevier journals available via its *Science Direct* service

because the price is too high, resulting in a considerable diminishing of information available to their students and scholars.

Even though researchers and scientists frequently testify that scholarship works best when it is open and free, they are often forced to compromise their principles and cooperating with private interests concerned only with profits. If the fruits of scholarship and research are going to be handed over to private interests anyway, the public is surely right to invest its money elsewhere. As private interests seize more and more scholarship and restrict access to paying subscribers or professors under contract to serve them, the ivory tower will have outlived its usefulness to taxpayers and will require more and more funds from private corporations to survive. This will destroy the university's autonomy and inhibit its ability to conduct disinterested basic research.

On a purely ideological level, the answer is simple: A professor working for a public university has an ethical duty to ensure that the results of her research should be available to anyone who might benefit—and this is beginning to happen with journals like *PLOS Biology*. This "open access" journal is freely available online and is funded by the Public Library of Science, a San Francisco non-profit organization co-founded by a Nobel Prize winner. The journal recently published a groundbreaking article concerning brain implants in monkeys which may revolutionize the prosthetics industry. The head researcher of the study, Miguel Nicolelis, published the article with *PLOS Biology* to "demonstrate support for 'open-access' journals" (Goldsmith B1). Supporting open-access journals makes sense to many academic researchers. After all, a research university's mission is to advance knowledge in the arts and sciences for the betterment of all—not

just the fund provider. More importantly, research universities are one of the only places where scholars can engage in basic research, that is, research that has no obvious practical application but may very well lead to paradigm shifts affecting entire industries and disciplines. "Learning for the sake of learning" almost inevitably becomes "learning for the sake of progress." Vannevar Bush extols the virtues and necessity of basic research in *Science: The Endless Frontier*:

> Basic research is performed without thought of practical ends. It results in general knowledge and an understanding of nature and its laws. This general knowledge provides the means of answering a large number of important practical problems, though it may not give a complete specific answer to any of them. The scientist doing basic research may not be at all interested in the practical applications of his work, yet the further progress of industrial development would eventually stagnate if basic scientific research were long neglected. (18)

Bush reiterates this theme throughout his work, returning again and again to the point that "basic research leads to new knowledge," and the place where basic research is best cultivated is at publicly and privately supported colleges and universities (19). Bush argues strongly that all scientific information should be made available to the public as cheaply as possible. Even in cases where the release of knowledge might given an enemy country some advantage in developing weapons, Bush argues that openness is a better policy than secrecy:

> A broad dissemination of scientific information upon which further advances can readily be made furnishes a sounder foundation for our national security than a policy of restriction which would impede our own progress although imposed in the hope that possible enemies would not catch up with us. (29)

Bush's arguments were compelling enough in 1945 to convince Congress to pass the National Science Foundation Act of 1950, which created the NSF. Even today the NSF funds 20% of the basic research performed in American colleges and universities and commands a budget of $5.5 billion ("NSF at a Glance"). Bush writes that "it is chiefly in these institutions that scientists may work in an atmosphere which is relatively free from the adverse pressure of convention, prejudice, and commercial necessity" (19). It is clear to Bush that industry and private corporations cannot or will not support the type of research that is most valuable and essential to scientific progress. Bush also realized that "science cannot live by and unto itself alone," and called any program "folly" that funded research in natural science and medicine at the expense of humanities and social science programs which are "so essential to national well-being" (23).

Scholarship is comparable to *solar* energy; when the sun shines, it shines on all. The private interests and policies being drafted to serve them are treating scholarship as *electrical* energy: If the scholar does not or cannot pay, his lights go off. If scholarship *can* be free, why have it any other way?

The ideological position that "information must be free" is difficult to maintain in the face of continuous federal and state budget cuts. After all, research universities

produce information, and much of is indeed very valuable—valuable enough, it seems, to attract the attention of private interests who wish to "protect it" from the public and secure a monopoly on its use. For this reason, a university should receive the majority of its funding from the federal and state government and demand academic freedom. If universities must receive their funding from external sources, it is better to have as few strings attached as possible. When universities sacrifice their researchers' autonomy and academic freedom, they destroy the very features that make universities valuable to society.

In February, 2005, the Bush administration announced its plans to slash funds to education, eliminating or drastically reducing 48 educational programs and reducing the overall budget for education by one percent. It is likely that public schools will turn to private corporations to make up for this reduction of federal support. Thus the public school system will become less autonomous, and university professors will lose more of their academic freedom to conduct disinterested, independent research. The gradual withdrawal of the federal government from public education is a worrisome development for many scholars and social critics. According to Robert M. Berdahl, Chancellor of the University of California, Berkeley, the privatization of universities began during the administration of another Republican President: Ronald Reagan. Though public support for universities was strong in the 60s, when universities were considered a "public good" ultimately necessary for national security, Berdahl argues that by the 80s the "notion developed that the chief beneficiaries of universities were the students educated, not the public at large" ("Privatization"). Since the students were the ones receiving the benefits,

they should naturally be the ones to pay for it. As the state withdrew funds, the costs of tuition soared. Ronald Reagan called for the elimination of the U.S. Education Department and wanted to drastically reduce student financial aid (Arnone, et al. "Ronald").

Berdahl describes how the Novartis corporation managed to use its hefty grant to Berkeley to steer the research teams towards projects that promised a high potential for profit. However, Berdahl identifies an even greater problem: "The perception of the objectivity of our faculty may be compromised and with it the confidence that their research is dedicated to the public good" ("Privatization"). Henry Steck writes,

> While many research advances that advantage private interests no doubt add to the sum total of social utility (e.g., in the area of medicine and pharmaceuticals), one is hard-pressed to see the same widespread devotion by universities to poverty, labor unions, the arts, addressing class divisions, and the like. The corporatized university is the university of neither Morrill nor Cardinal John Henry Newman, of neither Robert Lynd nor Max Weber. (79)

According to Steck, universities have abandoned their obligations to the public and are too eager to serve corporate interests. This trend results in a disintegration of professorial autonomy. We see a vicious trend: As universities come to rely more and more on private corporations to fund projects and research, researchers lose autonomy and their academic freedom, and the public grows increasingly skeptical of the university as a trusted public

resource. The situation is unlikely to correct itself—corporations have great reasons to fund applied research at universities. Seth Shulman puts it most vividly:

> Long viewed as fertile havens for nurturing and cross-pollinating ideas that would be profitable only in future generations, the nation's research universities have come to be seen by corporate sponsors as tempting orchards of unclaimed conceptual fruit for the picking. (112)

If Congress is reluctant to support its public universities, scholars and researchers have little choice but to offer their most valuable assets—including their integrity—to private corporations. Sheldon Krimsky's study of 800 scientific papers published in 14 journals revealed that "one out of every three papers had a chief author with a financial interest connected to the research" (Blumenstyk A41). A 2003 study by Beckelman, Li, and Gross, published in the *Journal of the American Medical Association* found that "industry-sponsored studies were significantly more likely to reach conclusions that were favorable to the sponsor than were nonindustry studies" (463). Only 33% of medical journals and 3% of science journals required authors to disclose possible conflicts of interest. According to Beckman, Li, and Gross, one such conflict of interest may have led to the death of a participant in a gene therapy experiment. Such conflicts of interest are arising more often and compromise the integrity and legitimacy of university research.

Universities, of course, are also at fault when they refuse to turn over their content to the public as well. The only legitimate "owners" of the information produced by public universities is the public. The American Association of University Professors' "Statement on Copyright" states that "institutions of higher education are conducted for the common

good and not to further the interest of either the individual teacher or the institution as a whole" (AAUP, "Statement.") The AAUP argues that the best means of achieving this end is for faculty members to choose their own subject matter, intellectual approaches, and conclusions. The freedom to choose such things is the "very essence of academic freedom," and a university must not reserve for itself the right to censor or forbid the dissemination of any scholarly work produced by its faculty (AAUP, "Statement.") Universities also derive much of their funding by patenting and licensing the inventions of their faculty. In 1999, American universities received over $641 million from royalties and filed over 7,612 patents (Blumenstyk, "Universities" A49). Though such funds are undoubtedly needed by universities hit by wave after wave of federal and state budget cuts, such earnings may divert researchers from disinterested basic research and towards projects more capable of generating massive revenue. "The lure of profit combined with the lack of adequate public funding has seduced the scientific community largely to turn its back on basic research," writes Michael Perelman (9). "Employers are compelling researchers to adopt a code of secrecy, even though open communication has been one of the essential features of the scientific achievements of the past" (Perelman 9). When a graduate student at the University of South Florida applied for some patents related to a sewage treatment project, the university had him arrested because the corporate sponsor of the project had been assigned all rights to the research. The student, Petr Taborsky, was accused of "grand theft of trade secrets" and sentenced to 3 ½ years of prison and even served on a chain gang (Perelman 91). The researchers working with Taborsky claimed he stole notebooks that did not belong to him; Taborsky claimed that he had

conducted the research on his own, after the project was completed—and, besides, as a graduate student, he had never signed any confidentiality agreements with the company sponsoring the research (Navarro 22). Whether one believes that Taborsky was guilty as charged or not, what is perhaps more significant here is the example of a corporate-sponsored university project leading to the arrest and conviction of a graduate student. Remarking on the case, David Lange, a Duke professor of intellectual property rights, said "It's hard to imagine circumstances sufficiently exacerbated under which a university would sue one its students, much less pursue criminal charges" (Navarro 22). Far from open and free, scientific research at public universities has become full of suspicion and great danger for those unwilling to play by the new rules.

Much like the city dweller who is told that he must now be especially vigilant at night because the reduced police force can no longer patrol his neighborhood, the administrators of research universities are told that their universities must now find other sources than government to support themselves. For scientists, this means securing grants from corporations interested purely in quick profits—thus, no basic research. Goldie Blumenstyk, writing for the *Chronicle of Higher* Education, describes the kinds of research industries are willing to support and the consequences of accepting their offers:

> Whether it's drug-company grants that restrict publication results—as occurred at the University of California at San Francisco a few years ago—or sponsorships from the oil and coal industries for researchers known for minimizing the threat of global warming, or the increasingly common practice of allowing medical-school professors to take research

> grants from companies that also pay them as consultants, entanglements with industry can be problematic. (A41)

Many corporations ask researchers to sign non-disclosure agreements which forbid them to publish their results—a trade-off Perelman calls "A Faustian bargain" (99). Sometimes researchers are asked to sign contracts which expressly forbid them from releasing findings that may prove financially detrimental to a corporation, even if those findings demonstrate a product's threat to public safety. For scholars of humanities, the "budget crunch" means fewer tenure-track lines, less travel money, and increased reliance on a growing body of low-paid adjuncts willing to teach increasingly skills-based undergraduate courses. Professors in both the arts and sciences are expected to routinely publish, which requires that they transfer all of the rights to their work to a commercial publisher, who will hold them forever and acutely restrict the distribution of their work and how they can be used by others.

Though most scholars loudly protest the corporate take-over of public universities, others, like Gary Olson, have come to accept it: "Scholarly publishing has virtually become an industry," writes Olson (19): "Survival within this competitive, cut-throat environment demands that we adopt a kind of *entrepreneurial spirit*—an attitude often foreign to most of us in the humanities" (19). Olson's advice is for scholars to consider the marketplace when considering which projects warrant their attention. Olson, himself a widely published scholarly editor, does not seem to notice the lopsidedness of the public university's partnership with industry. Rather than oppose the forces now

undermining the university's sacred mission, editors like Olson offer advice and propose strategies to help struggling scholars prosper in the scholarly marketplace.

How did the situation reach this point? The causes are many and it is beyond the scope of this dissertation to explore them all. However, one of the surest culprits is "intellectual property law," a loaded term referring to copyright, patent, trademark, and contract laws[11]. These policies have been misapplied to scholarship—and the results have been disastrous. For, if scholars were free of these chains imposed on them by commercial publishers and corporations, "the fruits of their intellectual labors" would spread further and wider, leading to radical innovations in technology, science, and human understanding. When a public can point to a university and identify the staggering contributions it has made to the public, then "budget cuts" are not called for; indeed, in the past, private corporations were happy enough to supply extra funding just to help spur the basic research so necessary for industrial development. Now that "intellectual property law" has come to serve the public university, the benefits that universities formerly bestowed upon the public are now secreted away to private interests, who can only maximize their already exorbitant profits by restricting access. Vannevar Bush warns repeatedly that "scientific progress on a broad front results from the free play of free intellects," and notes often how restrictions and industrial influence inhibits the scientific enterprise (12). When universities turn from basic research to applied research,

[11] Several critics have pointed out the propagandistic value of the term "intellectual property." Siva Vaidhyanathan calls it a "trump card in public discourse," stopping all discussion because *property* rights are an indispensable part of American capitalism ("Copyrights" 187). Richard Stallman argues that the term should be avoided because it "carries with it a hidden assumption—that the most natural way to think about the issue of copying is with an analogy with physical objects" ("Words to Avoid" 189). According to

and then allow corporate sponsors to control their research and restrict their findings, scientific progress is compromised.

Countless scholars and critics (including Thomas Jefferson) have remarked that information is a resource which can be shared without loss to the sharer. Whereas a scholar may be reluctant to loan her colleague a book for fear the colleague may never return it, the same scholar would likely not think twice about making a digital copy available online for everyone else to use. Indeed, the only reason a scholar would choose *not* to share the resource would be fear of violating copyright law. Perelman writes that the artificial scarcities generated by copyrights "serve no social purpose whatsoever. [They] do not increase the supply of information. [They] only spread ignorance" (177). Copyright law and non-disclosure agreements can obstruct scholarship and thus stifle progress. However, while sharing might not harm such scholars, the publisher of the document might feel much differently. The only way the publisher can make a profit or recoup losses is if readers pay for access.

Peter Lymann argues that copyright law stands in stark contrast to classical scholarly values. According to Lymann, "both the production and consumption of scholarly information are governed by a culture of gift exchange" (368). The academic community sees scholarship as something produced by "members of scholarly guilds" and *distribute* freely via the library system (368). Academics write and publish primarily to "sustain a sense of community greater than the fragmenting force of specialization and markets" (368). Many scholars disagree with Lymann—copyright law, when properly

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Stallman, we can intelligently discuss patents, copyrights, and so on, but anything one can say about "intellectual property" is simply nonsense.

applied, can protect scholarship and academic freedom. The American Association of University Professors, as noted earlier, argue in their "Statement on Copyright" that copyright law should be applied "so as to encourage the discovery of new knowledge and its dissemination to students, to the profession, and to the public" (AAUP, "Statement.") The AAUP argues that the public is best served if individual professors, rather than institutions or journal editors, retain the copyright to their works. This is possible because of the "academic exception" scholars enjoy when they produce scholarly works—works that would be treated as "works-for-hire" in industry and legally controlled by the company commissioning the research. Corynne McSherry believes that the "academic exception" and copyright protection for scholarly works are incompatible:

> The central problem is this: the position of faculty and the university itself as arbiters of true and valuable knowledge—the very position that […] justifies the academic exception—depends on the location of academia outside the realm of commodity production and circulation. Yet copyright law produces creative works as commodities and academic creators as owners. Can faculty continue to position themselves as intellectual property owners while simultaneously retaining the "cognitive property" claims that accompany their "nonmarket" subject positions? [...] Can faculty use a body of law designed to promote the distribution of intellectual commodities to resist the commodification of intellectual work? (103)

The publishing industry usually sees academics as the producers of fixed commodities. For-profit academic publishers try to secure all rights to works and sell them at monopoly rates. Since the scholar's reward for publication is essentially prestige or glory rather than profits, her best interests are to ensure that her work is available to as many others as possible. To great extent, a well-known publisher is the best means of achieving this end. The commercial publisher, meanwhile, is determined either to make a profit—by *limiting* access so he can sell more products at higher prices. Even Ivy League schools like Harvard and Cornell are dropping journal subscriptions through Elsevier, who many accuse of price gouging ("Libraries take a Stand"). Scholars always seem to have a conflict of interest when dealing with commercial publishers. Whereas in earlier times print publication was the best way to ensure that the greatest number of scholars had access to a work, now "open access" electronic publication is demonstrating its superiority.

Perhaps the best example of a university striving to serve the public interest is the Michigan Institute of Technology. MIT's *OpenCourseWare* project is an effort to make its courses freely available online. As of 2004, MIT has published 900 courses, complete with syllabi, assignments, readings, and links to related resources ("About OCW"). According to MIT's evaluation report of OCW, the site receives an average of 12,000 visitors per day—with 45% of these are from North America and Canada (Carson 3). Regular visitors include self-learners, educators looking for innovative course materials, and students. Clearly, MIT is fulfilling its mission "to advance knowledge and educate students in science, technology, and other areas of scholarship that will best serve the

nation and the world" (Carson 31). Charles M. Vest, President of MIT, has this to say about the project:

> OpenCourseWare looks counterintuitive in a market-driven world. It goes against the grain of current material values. But it really is consistent with what I believe is the best about MIT. It is innovative. It expresses our belief in the way education can be advanced – by constantly widening access to information and by inspiring others to participate. (Carson 31)

By making all of these valuable materials freely available online, MIT has greatly extended its influence. The OpenCourseWare project may serve as a model for other universities hoping to make a difference in the digital age.

Copyrights and Cultural Deprivation

If a scholar *could* make her work freely available worldwide, why might she hesitate to do so? The answer, of course, pertains to what she perceives as her "intellectual property rights," namely, the copyright of her text and the patenting of any potentially valuable information she has uncovered or described in her document. The patent problem is not really at issue here; after all, the purpose of securing a patent is so that inventors or discoverers can discuss or publish results without fear that someone will try to *use* the information to compete economically with the patent owner. The protection afforded by the patent is "traded" for the disclosure of information that the owner might otherwise keep secret for trade reasons. Though the patent system has become highly

problematic over the past few decades, and has been the target of scathing criticism by countless venerable authors, such concerns are beyond the scope of this dissertation.

What will be closely examined is copyright. Copyright law specifically protects only a unique "expression of ideas," not the ideas themselves. The law emerged to protect the private interests of publishers, who argued that they could only make profits if they were granted monopoly rights to the texts they published. David R. Koepsell argues that "the law of copyright grew out of *de facto* monopolies which developed along with the establishment of presses" (46). According to Mark Rose, the copyright laws we know today were born in what he calls a "regime of regulation rather than regime of property" (15). The guild that controlled the printing industry; the stationer's guild, struck a bargain with the state—the state would grant the guild a monopoly on publishing, and in return the guild would publish no documents that did not meet with royal approval. Peter Jaszi argues that the original copyright act, the Statute of Anne in 1710, "was the result of lobbying by and for established London based publishers and booksellers seeking new legal weapons against down-market competition" (32). The publishers and the government formed a partnership that flourished for many decades.

This partnership failed in 1692 when the House of Commons refused to renew the stationer's Licensing Act (Ewing, "Copyrights"). The legislators were convinced that the stationers had abused their privileges. For a few years, the state abolished all such monopolies and publishers were free to print whatever works they wanted. However, authors soon demanded the right to control who could publish their work and in what

quantities. The 1709 Statute of Anne, which met with some resistance from the publishers, granted copyright privileges to authors of works. Ewing writes:

> The booksellers were outraged. While the statute restored order to the trade, it also fundamentally changed the nature of their monopoly. A copyright that expired meant a decrease in its value, as well as an increase in risk. The booksellers fought back. ("Copyrights")

The affair was finally settled in 1774, when the House of Lords ruled that while an author's copyright was a common-law right, copyrights would not be perpetual.

On the surface, the bargain struck by copyright seems to be a good one for authors and the communities they serve. Without such protection, one wonders if authors could earn a reasonable income performing what is widely considered a useful and valuable trade. What is critical to note here is that authors are routinely required to assign all copyrights to publishers *before* they appear in print. Thus, the publishers, not the authors, are better served by stern copyright law.

In 1909, American publishers scored a dizzying triumph over authors: Congress established corporate authorship, which was the "real death of the author" (Vaidhyanathan, "Copyrights" 24). "Authorship could not be considered mystical or romantic after 1909," writes Vaidhyanathan, "it was simply a construct of convenience, malleable by contract" ("Copyrights" 24). The 1909 revision allowed corporations to secure the same rights previously granted to single authors. Thus, the old Romantic justifications for copyright were no longer valid. Mark Rose points out that even though the term *author* has "been drained of content," it still plays a vital role in the discourse of

copyright and the propaganda of publishers (136). The Romantic concept of authorship is very useful to commercial publishers, even if it is visibly flawed and has fallen under attack by postmodern and poststructuralist theorists and critics. Commercial publishers, meanwhile, have used their leverage and massive profits to lobby Congress to further extend the scope and power of copyright law. Lawrence Lessig describes how Congress has extended the duration of copyright until it now seems that copyright owners will enjoy their "property" perpetually:

> Beginning in 1962, Congress started a practice that has defined copyright law since. Eleven times in the last forty years, Congress has extended the terms of existing copyrights; twice in those forty years, Congress extended the term of future copyrights. Initially, the extensions of existing copyrights were short, a mere one to two years. In 1976, Congress extended all existing copyrights by nineteen years. And in 1998, in the Sonny Bono Copyright Term Extension Act, Congress extended the term of existing and future copyrights by twenty years. (*Free Culture*, 34)

Yet, writes William Cornish, the author receives no benefit from this long duration because they must "dispose of their copyright for a lump sum at the outset" (42). The publisher benefits far more than the author.

Let us assume for the moment that authors of creative works, such as novels, and authors of trade publications, such as guidebooks, would refuse to write and release their works without monetary compensation. In such a preposterous state of affairs, copyright law would be a valuable tradeoff for access to so many worthy books, journals,

newspapers, and magazines. Nevertheless, we are still left without a justification for copyrighting works of scholarship. As McSherry points out, "Academic authors are supposed to write for honor, and the academic system of exchange is supposed to be based on the reciprocal and personalized exchange of gifts," not the "impersonal selling of private property" (230). Mario Biagioli goes a step further with an insightful argument about the fundamental disparity between copyright law and scientific research:

> Saying that scientists are authors because their papers reflect personal creativity and original expression (the kind of claim that justifies copyright) would actually disqualify them as scientists because it would place their work in the domain of artifacts and fictions, not truth. A creative scientist (in the sense that IP gives to creativity and originality) is a fraudulent one. (257)

Though many postmodern or poststructuralist critics might challenge Biagioli's assumptions about language and truth, it is doubtful whether many scientists would disagree that the value of their work lies not in how their reports are expressed, but rather the importance of their findings. Indeed, most scientific articles are co-authored by hundreds of scientists, none of whom could really be said to be the author of the document. Indeed, the importance of authorship as it concerns these documents lies not in whose name is *listed*, but rather whose names *are not listed*, since such a failing may damage the credibility of such documents (Biagioli 272).

According to the Council of Graduate Schools, "In the humanities, the model of the lone scholar working independently still prevails" (10). This difference likely exists

because of the radically different methods and methodologies of humanities scholars compared to scientists, and, of course, humanities scholars have a much different relationship to texts than scientists. Whereas a scientist might evaluate writing based on its clarity and precision, a student of literature might talk of voice, sublimity, or ideologies. These scholars are not willing to conceive of language as a transparent and neutral means for sharing information. Some teachers of writing still talk of writing in almost metaphysical terms, emphasizing the personal voice and the author's self. Andrea Lunsford and Lisa Ede have written often on this subject, and have pushed hard for change among teachers of writing. "The most immediate need is for a pedagogy of collaboration," write Ede and Lunsford, "one that would view writing as always shared and social" (438). Though I will return to this thought in my final chapter, suffice it to say here that the conception of the authorship necessary for justifying copyright law falls is much less convincing when one studies seriously the inherently collaborative nature of the actual writing process: "All dissertation research is collaborative in some sense," state the Council of Graduate Schools (10).

Whatever one believes about the relationship of language to authorship and truth, one fact that cannot be disputed is that the same economic factors that attempt to justify the copyright system for commercial authors fail to make a convincing case for the copyrighting of scholarly works, who publish documents for very different reasons than commercial authors. Furthermore, since most scholarship is produced for a very narrow circle of specialists, it does not often fair very well in the open marketplace, and can be made profitable only with recourse to laws and policies that undermine it.

Below, I discuss the scholarly publishing via university presses, commercial presses, and finally electronic publishing. I conclude this chapter with a discussion of the copyrighting of dissertations.

University and Non-Profit Print Publishing

University presses emerged as a means of publishing scholarly books that no sensible commercial publisher would ever dream of printing. These presses were often heavily subsidized by their home university but were still expected to recoup some of the losses via sales to scholars and libraries. Naturally, as universities faced ever-tightening budgets, these subsidies lessened, and university presses were expected to break even. The results are troubling. Lowered budgets mean that the university presses must now sell more books than ever before, yet the same shrinking budgets also prevent libraries from purchasing them. Lisa Freeman writes, "When I began to work in scholarly publishing in 1980, we assumed that a typical peer-reviewed […] monograph […] would sell a minimum of 1,500 copies. That number is now closer to 400 or 500" (148). To sell more copies, university presses have been culling highly specialized books from their lists—books which Freeman describes as "the very books that the press was created to publish in the first place" (148).

In the economics of publishing, small print runs result in very high prices for each book. Jennifer Crewe, editorial director of Columbia University Press, wrote in 2004 that "most scholars are surprised to learn that it costs a university press about $25,000 to $30,000 to publish a book of average length without too many illustrations" (25). Since

the publisher can expect to sell only a small number of copies of any particular scholarly book, the costs of publication and distribution must be recouped by charging high prices for each book sold. Thus, a mass-market paperback might cost only a few dollars, whereas a scholarly book of the same size and quality may cost a hundred. The problem has been greatly exacerbated by massive cuts to library funds; libraries constitute the major purchaser of academic books. The University of Iowa recently received a whopping $35 million reduction in its library budget and had to cancel journal subscriptions, slash book purchases, and even layoff great numbers of staff (Carnevale, "Libraries with Tight Budgets"). Duke's medical-center library suffered massive budget cuts and had to cancel 525 of its 1,753 titles and drop $400,000 worth of Elsevier titles (Guterman, "The Promise"). One might think that since so many of the new scholarly books are not available in the library, that more scholars would purchase their own copies. This has not proven to be the case. Judith Ryan writes, "There is a frustrating paradox at work here: we want our own books on literature to be published, but we scarcely buy those written by our peers" (9). Jennifer Crewe argues that one reason why individual scholars are reluctant to purchase these books is the "glut of such books," which can be squarely blamed on the publish or perish mindset of so many promotion and tenure committees (27). To avoid paying high prices for books, scholars have turned to photocopying and interlibrary loans (Freeman 148).

University presses and non-profit publishers of scholarly materials can hardly expect to endure under these harsh circumstances. Although some major academic publishers have leaped boldly into open-access electronic formats, some presses seem to

be quite unwilling to fade away gracefully. University press directors and journal editors locked into the print paradigm view free electronic publication as unfair competition rather than the next logical step for academic publishing. Kevin Guthrie, one of the key developers of an online database of full-text journal articles called JSTOR, found that many of the journals owned by scholarly associations "justifiably regarded a JSTOR initiative on current issues to be competition" (136). The publishers' circular argument is that if the articles were freely available online, then no one would buy the print edition. If no one buys the print edition, then the journal and whatever scholarly association is attached to it will collapse. The paradox is that these publishers claim that the only way they can promote the distribution of scholarly materials is by enforcing copyright laws to restrict their distribution. What no one seems willing to admit is that the actual print versions serve little value to scholars; what matters is the material within them. Even so, few scholars would seem to prefer having the majority of their field's scholarship available to them freely online than to have a few works available to them in print form. Meanwhile, authors whose works appear in these journals find that even though they wrote their articles and books for free (or perhaps even paid or helped subsidize their publication), the publishers demand that the authors turn over full copyrights—which they use to levy fees for use of the articles in course packs. As Richard Stallman puts it, "Many journal publishers appear to believe that the purpose of scientific literature is to enable them to publish journals so as to collect subscriptions […] Such thinking is known as 'confusion of the means with the ends'" ("Science" 87). Scholarly organizations need to reevaluate the purpose of their journals and the best way to serve their members.

Commercial and For-Profit Print Publishing

Given the dire situation of non-profit academic publishing, one might be surprised to hear of incredible profits being reaped by commercial publishers of academic work. Nevertheless, the commercial publisher Elsevier makes a 40% rate of return on its publication of scientific journals (Perelman 92). In 2004, the university system spends over $8 million annually on Elsevier titles, half of which were digital (Guterman, "The Promise"). These profits are possible because so many scholarly associations cannot afford to publish their own journals, and the few who do must also charge high prices to cover printing and administrative costs. Elsevier is willing to take on these costs, but then charges libraries and scholars high rates. The absurdity is that even though these publishers pay authors (and often even editors) nothing, they demand that libraries pay "monopolistic subscription" rates before they will share them (Vaidhyanathan 136). Even though these arrangements are hardly beneficial to either authors or scholars, the print publishing requirement of so many tenure and hiring committees keeps the commercial journal publishing industry thriving. Professors are pressured to publish in "prestigious" print journals, and companies like Elsevier are usually the only viable avenue.

Andrew Odlyzko argues that the reason so many scholars put up with this extortion is that "it costs them nothing to submit papers to such journals and also costs them nothing to have their library buy the journals" ("Economics" 391). In 1994, Odlyzko analyzed the library budgets at hundreds of universities and found that "the average cost of the library system at leading research universities is about $12,000 per

faculty member. This figure, however, is not visible to the scholars, and they have no control over it" ("Economics" 391). Thus, except in the rare cases when a scholar must turn to her own resources to purchase a journal or scholarly book, the costs of this price gouging is passed on to the public. The commercial publishers of academic journals and books thus represent little more than a parasite, inhibiting research and raising the public's animosity towards the university.

Odlyzko is a scathing critic of commercial publishers like Elsevier. He cites the high discrepancy between article costs ($1,000 in some journals and over $8,000 in others) as an example of the inefficiency inherent in any monopoly system. Odlyzko writes, "Some publishers keep over 75% of the revenues from journals just for distributing [them], with all the work of editing and printing being done by learned societies" ("Economics" 383). Other commercial publishers rely on the sell of overpriced textbooks to keep them afloat. Philip G. Altbach writes that "the textbook industry is the proverbial tale that wags the dog in the publishing industry; a very large part of publishers' stable income comes from textbooks" (5). According to Altbach, the key to maintaining this stability are professors or curriculum experts who "act as middlemen between publishers and the public" (5). A 2004 national survey of textbook prices found that the average college student spends over $900 a year on textbooks from publishers who use "a variety of tactics to inflate the costs of textbooks" (Calpirg 1). The tactics mentioned in the survey include releasing new editions every three years with only minor or cosmetic changes, bundling textbooks with expensive and often undesired ancillary materials, and charging students in America more for books than students overseas. At

least one publisher, Pearson Education, was concerned enough about the high prices to release a whole series of electronic versions of its print textbooks and available for half the price (Calpirg 6). It seems likely that, as more publishers offer discounted electronic textbooks, the prices will fall across the board. Eventually, commercial publishers may be able to offer free online textbooks by soliciting corporate sponsors and advertisers to defray costs and generate revenue. It is also possible that groups of scholars can produce free peer-reviewed textbooks and make them available for free online or via a print-on-demand service. Perhaps a federal or state grant could be secured for the purpose of building such materials.

Electronic Publishing

The moral and economic costs of "getting into print" can exceed their benefits. The print paradigm has reached a crisis point—the only sensible answer is to abandon print and embrace electronic publication. However, electronic publication is no panacea. When these commercial companies do publish works online, they carefully restrict access only to paying members and charge libraries massive licensing fees for access to databases. Of course, the trick to maximizing the profits of these companies is not only to threaten infringers with litigation, but to invest in technologies designed to exclude scholars who do not intend to pay for the privilege of accessing scholarship. Two examples of these technologies are e-books and subscription databases.

Siva Vaidhyanathan describes the challenges of making money selling e-books. He writes, "The challenge of e-books is encryption. Selling one unencrypted biology e-

textbook to one student in a three-hundred person class might result in one sale and 299 unauthorized digital copies" ("Anarchist" 147). A helpful student might decide to help her colleagues by simply posting the e-book to a peer-to-peer network like Kazaa, which would allow her to easily share it with not only her classmates but anyone else with access to the network. Publishers have sought to prevent this sharing with the use of encryption and copy protection schemes that make copying the file more difficult.

Publishers have also considered and are implementing new forms of payment and methods of access. Instead of merely selling an e-book once, publishers may wish to charge the student a small fee each time he accesses it, or perhaps include a self-destruction routine so that the e-book is automatically deleted after an established time has elapsed. Whereas in earlier times publishers had no accurate way of gauging how many sales were "lost" because students found photocopying cheaper, proprietary computer databases allow them to carefully monitor which pages are accessed, what material has been copied, and which parts have been printed. The publishers could easily institute a fee for each process. Vaidhyanathan worries that such developments might eventually turn libraries into Kinko's or Barnes and Noble Superstores, where users must pay per-use fees for "intellectual property." Richard Stallman writes that far from making information more accessible, e-books actually restrict readers more than printed ones: "You can read them only with special secret software designed to restrict you" ("Misinterpreting" 83). So far, the publishers have been dealt with violations of these restrictions heavy-handedly. Adobe even charged Dimitri Sklyarov, a Russian developer, for distributing programs that allowed users to convert Adobe's heavily restricted e-books

into the freer PDF files. The litigation was possible because of new extensions of copyright power included in the Digital Millennium Copyright Act. Jeffrey Matsuura describes this "anticircumvention provision" of the DMCA:

> This provision in the DMCA provides for both civil and criminal law penalties for developers, distributors, and users of technology (including computer programs) that can be used to "circumvent" systems designed to protect copyrighted material from unauthorized use […] The provision can be applied to technology that merely has the capability of facilitating unauthorized use of copyrighted material, regardless of whether it also has other lawful applications. (13)

Such harsh legal penalties are necessary in a digital age liberated by the Internet. Steven Levy writes that the Arpanet, the early incarnation of the Internet, "was very much influenced by the Hacker Ethic, in that among its values was the belief that systems should be decentralized, encourage exploration, and urge a free flow of information" (135). Given the inherently liberating architecture of the Internet, maintaining the rigid control commercial publishers formerly enjoyed during the reign of print is a difficult and costly process. Lawrence Lessig's books *Code* and *The Future of Ideas* describe the publishing industry's efforts to digitally protect or encrypt information to prevent its "unauthorized distribution." According to Lessig, the cyberspace's "architecture will affect whether behavior can be controlled" (*Code* 20). However, despite Lessig's insistence that the *code* will ultimately decide the issue, history seems to indicate otherwise. Commercial software publishers have been forced to deal with "piracy" since

the very first commercial program was sold, and early on appealed to Congress to lend a hand in damming the free flow of information. If the Internet can be rebuilt to better serve corporate interests, it will require a combination of architectural changes and heavy government interference.

For scholars, the Internet's value lies precisely in its freedom and accessibility. For publishers, the unregulated nature of the Internet is a constant threat to what they view as *their* "intellectual property." Even non-profit publishers may seek to charge stiff fees for electronic access in order to recoup losses and keep up the demand for their print publications. Odlyzko writes that scholars "have no incentive to cooperate with the publishers in maintaining a high overhead system" ("Economics" 380). For Odlyzko, a viable solution is for scholars to turn to *free* electronic publication. However, an obvious problem with self-publishing (electronic or print) is the lack of quality control. Professional editors are not a superfluous part of scholarship; they greatly improve it by clarifying writing and detecting and correcting mistakes. Nevertheless, acquiring the services of professional editors for free journals is not impossible. Odlyzko writes, "I expect that what editing assistance might be required will not cost anywhere near what print journals cost, and so might be provided by the authors' institutions. If that happens, electronic journals can be distributed freely" ("Tragic" 99). Of course, many journals are edited "in-house" by volunteer professors or even graduate students who are indeed financed by subsidies from the university (and only in small part by subscription fees). University administrators should realize that they could save a great deal of money by putting up the necessary funds to support free electronic journals.

In 2004, the Royal Society published a response to the House of Commons' inquiry into scientific publications. Part of the response deals with making scientific publications freely available on the Internet. While the Royal Society claims to be "in favour of the widest practicable dissemination of science," open access journals are "lack a sustainable business model" ("Royal"). Their reasoning is based primarily on the assumption that authors will have to be pay exorbitant article processing fees that are currently fully or partially subsidized by subscription fees. BioMed Central, a large and respected publisher of open access journals, currently charges authors $1,580 for publication in *Journal of Biology*, but as little as $340 for other journals (BioMed Central, "FAQ"). These costs are necessary to offset the costs of editing, reviewing, and publishing. However, charging authors fees to help subsidize their own journal publications is nothing new. Edward Berman found in 1985 that journals in the hard sciences had been charging authors as much as $1,340 per article, and predicted that this trend would soon carry over into the "soft" sciences and eventually the humanities (Parson 126). Typically, the same grants that enable the research in the first place are also used to cover these publication fees.

The Royal Society recommends that "learned societies have liberal copyright policies and make their publications available at as low a cost as is reasonably" ("Keeping" 19), but stop short of demanding free access. This requirement seems quite consistent with the Society's first journal, *Philosophical Transactions*, which was sold at a high enough price to cover its own publication costs and generate some revenue for the Society. Obviously, open access journals will require money, but it might not necessarily

come at the expense of general access. The open access journal publisher Public Library of Science received a $9 million dollar grant from the Gordon and Betty Moore Foundation (Larkin, "Public"). Open access publishers can and will find alternative sources of revenue.

Dissertations and Intellectual Property

Commercial publishers are eager to gain monopoly rights on the publication of journal articles and scholarly monographs, but the publication of dissertations is another matter. Many dissertations are undervalued as scholarship to the point where most universities are content to hand them over to a company that earns its profits by restricting access to only those willing and able to pay for the privilege. As I mentioned in Chapter Two, the commercial service UMI agreed to collect and distribute microfilm versions of dissertations only if the universities would agree to stop publishing and distributing bound versions of these documents (Ellsworth 241). Following is UMI's official explanation of its policies regarding Interlibrary loans:

> As long as interlibrary loan is a customary service you provide and the use of the materials for interlibrary loan is not done in a manner and a magnitude that would replace the recipient library's own subscription or use of the database, product or the purchase of the underlying materials, the customer institution is allowed to print selected materials and include them in their interlibrary loan program. With respect to our Digital Dissertations product, we ask that interlibrary loan be restricted to one

> printed copy of any specific dissertation at any one time. Thus, if a library has a printed copy of dissertation "x" already on loan to library A, it may not also provide another copy of dissertation "x" to library B until library A has returned or destroyed the copy of the Dissertation provided to it. (ProQuest, "Interlibrary Loan Policy")

We see an attempt to reconcile two opposing interests. On the one hand, scholars would enjoy having greater access to dissertations, and the library's mission is to provide, to the best of its ability, such availability. This goal is complicated by ProQuest's obligations to make money for its shareholders. Thus, it is in their best interest to force libraries to limit themselves to "one printed copy of any specific dissertation" ("Interlibrary Loan Policy"). Many scholars and libraries seem willing to accept such limitations for the sake of ProQuest's profits in exchange for access to UMI's massive digital collections.

An opposite trend might be for more universities to make their dissertations and theses freely available online and leave the printing, if desired, up to the end-user. The NDLTD represents the greatest effort to achieve this goal. Virginia Tech is now offering 4,383 unrestricted ETDs UMI is offering electronic versions in Adobe's patented PDF format, though they charge $30 or more per download. Is $30 a reasonable price to pay for downloading a dissertation stored in PDF format? Considering that PDF files are highly compressed (typically only a few megabytes even for a lengthy document) and easy to generate (UMI offers no added value in terms of hypertext features), a *fair* price might be $5 or less. A quick visit to eBooks.com reveals that most eBooks retail for $5-$17, and these are all professionally edited and illustrated. Even literary theory eBooks

average $30, though some are over a hundred. I expect that the higher priced eBooks are inflated so that they do not compete "unfairly" with the printed versions[12]. The paradox here is that, on the one hand, so many hiring, tenure, and promotion committees insist that *print publication* is what counts. On the other hand, the publishers realize that if, given the choice, most readers would gladly pay $30 to download an eBook than pay $150 for the same work in print. The publisher thus works to keep the price discrepancy at a minimum. In other words, the publisher must severely limit access to the electronic version of a document so that it will not seriously compete with the print version! The print version is an unnecessary encumbrance; an albatross that burdens scholars and libraries by keeping access to scholarship expensive.

Nevertheless, some students wish to use their leverage as copyright holders to prevent the free electronic publication of her publication. One of the most frequent arguments cited by students seeking to restrict access to their dissertations is that making them freely available online might lessen or even eliminate the possibility that a commercial or university press might publish their dissertation in print form. Clearly, a student whose dissertation is accepted for traditional publication has a powerful bargaining chip to use in securing a tenure-track appointment at a good university. The idea that electronic publication might eliminate this possibility is certainly a fearful one.

However, Joseph Moxley and many others have pointed out that this fear is groundless: "After all," Moxley writes, "students must significantly revise their academic work, particularly the detailed account of their results, to accommodate the differences

[12] See http://ebooks.com for a list of popular and academic eBooks.

between academic and commercial publishing" (103). Moxley also adds that a dissertation freely available online might attract more interest than one relegated to microfilm or restricted PDF. Joan Dalton's survey of publishers revealed that the publication of ETDs does not affect the journal or book publication of revised dissertations (264). Paul Parsons writes that most editors distinguish dissertations from books: "One [is] to earn a stamp of academic validity, the other to offer knowledge to an audience" (114). According to this view, the dissertation process may at best provide an author with the knowledge and skills required to write a scholarly book; the dissertation as such is unpublishable. However, even if a dissertation is written with book-publication in mind from the outset, chances are that, if it is selected for book publication, the final version will differ enough from the original that publishers are not concerned about the previous electronic publication.

The benefits to the student of publishing her work as a freely available ETD are considerable. Gail McMillan writes that "the most popular ETD in 1997 was accessed 9,923 times. In 1998 the most popular ETD was accessed 75,340 times" (320). These ETDs were accessed by citizens from around the world, many of whom may be scholars working in the same field. Even if an ETD was only accessed five times, that may very well be five more times that it would be accessed if only available from UMI on microfilm or $30 PDF download. Furthermore, assuming that print publication was a student's goal, the fact that an ETD had been accessed several thousands of times might help convince a publisher that a dissertation warranted publication. Thus, far from

injuring a student's shot at publication, an extensively accessed and widely available ETD might greatly increase the odds.

According to statistics available at the Digital Library and Archives webpage at Virginia Tech, 73% of students gave their permission for their ETDs to be released worldwide. It is doubtful that the other 27% of dissertations will find their way into print publication. Instead, whatever potential value they may have held for scholarship will be lost because universities do not own the work.

Why don't universities, particularly public universities, simply require that students release their dissertations into the public domain or perhaps license them with an alternative copyright scheme like copyleft or Creative Commons? These alternatives to copyright allow the author some control of the document, but bestow the right to copy and distribute the document upon anyone who might desire to do so. The reason is clear: universities do not wish to engage in costly litigation with disgruntled students over copyright issues and would prefer them to offer their work freely. On a small scale, concerned groups like the open Access Initiative are working hand-in-hand with the NDLTD to teach dissertation authors about the personal and societal benefits of making their work freely available. Hussein Suleman writes that both the American Chemical Society and the American Physics Society have been receptive to this issue and are warming to the idea of free online publication (58). Many print publishers have agreed that electronic publication of an ETD does not constitute "prior publication."

It remains to be seen whether American public universities, so heavily penetrated by corporate and private interests, will manage to overcome the ideological obstacles standing in the way of the NDLTD and free scholarship.

Chapter Four

Paradigm Shiftlessness

When one considers all of the problems inherent with the conventional model of the dissertation process, and with print-based scholarship in general, and how much people all over the world might gain from a new concept of scholarship—the reluctance of so many American students to produce innovative electronic dissertations and to file them with the *National Digital Library of Theses and Dissertations* is puzzling and disappointing. Why have so few American universities required electronic theses and dissertations? ETDs are 100 times more likely to be circulated than print dissertations, but only twenty five American universities currently require them (*NDLTD Members*). This is up from five requiring them in 2001: Virginia Tech, West Virginia University, East Tennessee State University, University of North Texas, and the University of Texas at Austin (Moxley, "Universities" 61). Change is happening, albeit not at the pace many would like. It's easy to get frustrated thinking about how vast reserve of quality scholarship in the form of dissertations and theses remains untapped, unreachable save by unnecessarily expensive and cumbersome means. When we limit ourselves to print technology or apply print-paradigm policies to regulate electronic scholarship, we're fueling our factories with coal instead of atomic fission. We destroy our natural resources, pollute our environment, and even then fail to achieve the efficiency possible with the newer technology. It's time to make the switch.

The greater question is why so many reputable scholars cling to print-based scholarship and seem incapable of reconsidering Romanticist notions of genius and individual ownership of texts and ideas. Change will only come when hiring, tenure, and promotion committees acknowledge the credibility of articles or books written collaboratively and published electronically.

Rubbing Salt in the Paradigm

All of these forms of resistance are understandable in the context of paradigms. Simply put, the reforms that I have championed in this dissertation run contrary to many years of established practice—years in which scholarship was obviously produced and advanced in countless fields. The current paradigm of print-based scholarship so central to the production of not only dissertations but all forms of published discourse can often be extended in various ways to make an "electronic revolution" seem unnecessary, regressive, or impossible.

For example, a well-meaning major professor might advise a dissertation author against the creation of an interactive webtext instead of a linear print text. The professor's objections might be that the work involved in making the project interactive would distract from the real work required of a dissertation author. Indeed, many early electronic dissertations do betray a certain fixation with hypertext features that do not necessarily make a document easier to access or a scholarly argument easier to follow. Another objection might be that the professor himself is untrained in computer technology and would not be able to evaluate such a document even if it were well

executed. Though we may judge ourselves to be experts of written discourse, we might feel distinctly amateurish when evaluating new media. It seems impossible that we might at once be masters of written discourse as well as visual and aural. Even with print discourse, we typically leave matters of formatting and textual layouts to others. Only now is "design" being represented in composition textbooks, and even then often given a single chapter somewhere towards the back. Another problem is the stability of the archive—how long can we reasonably expect electronic documents to last? Computers simply haven't been around long enough for anyone to judge whether electronic texts are more durable than paper, papyrus, or even older forms of writing. Who can say whether the digital documents we enjoy today will be available to our great-grandchildren? Finally, the professor might offer the pragmatic argument that a hiring committee might not consider a webtext a legitimate form for a dissertation, and thus the newly minted Ph.D. would find herself unemployable. All of these arguments are only possible within the paradigm of a print-based conception of scholarship, and as long as the professor is unable or unwilling to break free from its confines, he himself will never appreciate or discover what electronic scholarship truly has to offer his field. At best, electronic publication will serve as a cheaper, inferior substitute for print scholarship.

Thomas Kuhn's *The Structure of Scientific Revolutions* provides us with a convincing picture of how change occurs—not only in the sciences, but in any field of serious scholarly inquiry. Kuhn's text has been widely influential, and his theory of paradigm shifts has permeated scholarly discourse across the disciplines. Kuhn challenges the traditional view of scientific progress in cumulative stages. His argument

is that paradigms determine what counts as legitimate research in a discipline and are only abandoned when the field acknowledges that the old paradigm is inadequate compared to a newer one. Kuhn's major theme is that a scientific community's shift from one paradigm to another usually involves a long and arduous rhetorical struggle, with clear winners and losers. Understandably, scientists who have dedicated the majority of their lifetimes to learning and working within one paradigm are not eager to abandon all of their accumulated knowledge and experience as others shift to a new way of doing things. Kuhn writes, "As in manufacture so in science—retooling is an extravagance to be reserved for the occasion that demands it" (76). It follows, then, that scientific revolutions are only possible after a paradigm encounters an insurmountable crisis. Kuhn also argues that despite the gravity of such a crisis, the members of a field will still uphold the old paradigm unless a new and more promising paradigm already exists to take its place. He writes, "To reject one paradigm without simultaneously substituting another is to reject science itself" (79). Thus, one of the most important tasks a scholar such as myself can undertake is to work to convince other scholars that there is indeed a crisis taking place in scholarship—a crisis that the current print-based paradigm cannot resolve. I must also make a definitive case for a new paradigm that can realistically resolve the crisis and advance the field, all the while knowing that this new paradigm has the potential to radically devalue and undermine centuries of research.

Kuhn himself has little advice for those who embrace a new paradigm that challenges an older and better established one. Considering how much a community of

scientists might have to lose by abandoning their old methodology—and the knowledge they accumulated using it, Kuhn writes:

> How, then, are scientists brought to make this transposition? Part of the answer is that they are very often not. Copernicanism made few converts for almost a century after Copernicus' death. Newton's work was not generally accepted, particularly on the Continent, for more than half a century after the *Principia* appeared. […] Lifelong resistance, particularly from those whose productive careers have committed them to an older tradition of normal science, is not a violation of scientific standards but an index to the nature of scientific research itself. The source of resistance is the assurance that the older paradigm will ultimately solve all its problems, that nature can be shoved into the box the paradigm provides. (150)

Meanwhile, the "[scholar] who embraces a new paradigm at an early stage" can only rely on faith that the new paradigm "will succeed with the many large problems that confront it, knowing only that the older paradigm has failed with a few" (158). Even the computer industry is rife with examples of users and developers resisting innovations that would later become standard. In 1956, IBM was still promoting "punched card culture," even though one of its key competitors, UNIVAC, had introduced the magnetic tape readers that would ultimately revolutionize the industry. Though some technical arguments were raised in support of punched cards, Norman F. Schneidewind, an engineer working for UNIVAC at the time notes that "the opposition to magnetic tape input was more a reflection of culture and resistance to change than a substantive technical argument

against tape input" (60). An entire industry had been built around the manufacture of punch cards and their operation, and the alleged advantages of the new system were not enough in themselves to move the industry. A paradigm was in place, and only when the paradigm was sufficiently challenged were users willing to consider a new way of doing things.

Let us consider for a brief moment how scholars operating under the print-based paradigm view scholarship. Many might posit that scholarship is a sort of professional conversation that concerns a few fundamental questions that form the basis of a discipline. They would likely add that scholarship is composed of legitimate contributions to this conversation, almost always in the form of print-published, peer-reviewed articles and books, though conference presentations and maybe even classroom discussions "count" on some level. We could further differentiate these scholars into those who believe scholarship to be advancing or progressing towards truth in cumulative stages, and those who take a more *sophisticated* view (in the full sense of the term) that scholarship is more socially constructed or perhaps merely cyclical. Kuhn seems to take the latter view, and has been criticized for his alleged relativism. Dudley Shapere, who reviewed the book for *The Philosophical Review,* writes that "Kuhn has already told us that the decision of a scientific group to adopt a new paradigm is not based on good reasons; on the contrary, what counts as a good reason is determined by the decision" (392). For critics like Shapere, Kuhn only wins because he defines the rules of his own game. The problem is that one cannot get outside of paradigms to properly evaluate one, including Kuhn's. For Kuhn, scientific progress is ultimately rhetorical and not purely

objective. Though scientists like to think that they would gladly swap theories if new evidence rendered an old one untenable, what Kuhn shows is the strong role that the scientific community, or the actual human beings engaged in the field, plays in selecting what is tenable and untenable. Scientific truth is not found in nature but rather among the scientists who study it. Patricia Bizzell sees this "problem" as the key strength of Kuhn's analysis. For Bizzell, what is vital in Kuhn is not so much his notion of paradigms, but rather the role the community plays in establishing them. Bizzell writes: "The study of the ways in which a language community's methods of argumentation establish standards for thinking and acting together that are […] reasonable [is] the domain of rhetoric" (769). Thus, for Bizzell, the study of paradigms is essentially the study of rhetoric—a subject of rising importance in humanities departments.

Whether or not we agree with Kuhn, we can still use his analysis to understand how tacit assumptions about scholarship play a formative role in its ongoing development. With due acknowledgement of the Post-Structuralist critiques of authorship, we must still suppose that many scholars feel quite comfortable with the Romanticist notions of genius and private ownership of ideas that ultimately leads to thinking of scholarship as the production of discrete units. Within the paradigm, the valuation of these units becomes clear: The truly important contributions will be those from single authors (who are naturally more brilliant than those who must rely on collaboration) who produce well-cited scholarly monographs and journal articles. Of course, the publisher or journal where these scholars' thoughts appear must be prestigious—a "top-tier" or heavily selective venue known for its impressive rate of

rejection. As Bruce Thyer, author of a book called *Successful Publishing in Scholarly Journals* tells us, "Generally speaking, the higher the rejection rate of a given journal, the more prestigious it is seen to be" (12). Scholarship thrives in this "survival of the fittest" situation, where only the best and most fecund scholarship is committed to print.

Let us now consider an established scholar who has demonstrated his competence and moxie by somehow rising above the masses of rejected authors and produced a sterling list of top-tier journal articles and a prestigious row of scholarly monographs. Let us assume that this scholar is well-known, respected, lightly burdened, and highly-paid. Into the office of this "star" comes an eager young graduate student with the humble invitation to chair her dissertation committee. This dissertation, however, will not be like anything the distinguished professor has ever seen before. Indeed, this dissertation will be possible only in an online environment, where scholars and students from all other the world will form a community that will collaborate to build a terrific new resource. The student launches into a discussion of *wikis* or *blogs* and other "technical" terms best left unspoken by true scholars. She casually mentions that she will be collaborating with others—possibly hundreds, or even thousands of others—in the creation of images, sounds, and software. At last, she declares that some 70,000 visitors have registered on her site since she first began the project, and at this point the venerable professor's eyes rise to his row of neat, well-wrought books on the shelves above her head and says, "Well, that's all very exciting, but I don't think it's really what we mean when we use the term *dissertation*."

No matter what the student's arguments may be, she will be unable to change the professor's mind as long as he is only able to see her project from the perspective of the print paradigm. Why he should be willing to "convert" is far from obvious. For him to lend his personal credibility to this far-fetched "dissertation," no matter how innovative it may be, is to accept the possibility that the "old way" of doing scholarship, with which he has built an entire career and magnificent reputation, is not only old-fashioned but quite possibly irrelevant. What possible use could a generation of scholars like this one have for a row of "regular old books?" Kuhn writes, "There are always some men who cling to one or another of the older views," but they are ultimately "simply read out of the profession, which thereafter ignores their work" (18). Even Kuhn does not consider the possibility that rather than being "read out" of the profession, the star scholars of today might be "coded out."

We should consider, however, the better possibility that the scholar's work will be *coded in*; that is, his ways of knowing and doing scholarship will not be excluded but incorporated. According to Kuhn, a great many scientific crises may shake the foundations of a long-held paradigm, but few topple it. Scientists usually find ways to solve a crisis without abandoning their paradigm; or, they may simply leave the crisis to be dealt with by future generations better equipped to handle them. We see both of these approaches being taken towards the scholarship crisis. It is worth taking a moment to describe a few of these noble efforts of scholars to weather the storm of the digital revolution.

First, there is the argument and practice of taking articles previously (or simultaneously) appearing in print and publishing them online. Technologies like Adobe's *Acrobat* software make this process simple and affordable, and, better yet, "allow documents to be moved between computer operating systems while retaining the original document formatting" (Eaton 6). In a similar way, ebook-publishers are able to imitate many of the conventions of a printed book and even use code to artificially control who accesses them (thus re-introducing print-based scarcity into electronic publishing). Furthermore, since most scholars prefer to type their documents using word processors anyway (and many print publishers and editors specifically ask scholars for the digital files), the costs of publishing a document online are negligible. Of course, some scholars and even some publishers viciously resist the electronic publication of documents because, "If everyone accesses them online, who will buy the print version?" While few scholars are really interested in whether their publisher earns a profit on their work, this question is particularly alarming to professors who are evaluated (or evaluate themselves) solely on the basis of the number of print publications on their vitas. If the print venues dry up because of the cheapness of electronic publishing, they may find themselves with no way to secure tenure or promotion—or, perhaps more importantly, to demonstrate their competence to their peers.

To the extent that scholars and publishers try to force-fit the conventions and limitations of print-based publishing onto electronic publishing, the problem worsens. "Why," shrieks the scholars of the new generation, "does this ebook prevent me from copying and pasting this section into an email to my colleague in Poland?" "Why,"

demands another, "is there no place for me to add comments to the bottom of this electronic article?" "Tsk tsk," says another, "this author didn't even bother to include the video clips which would have made this project so much more effective." Expectations are rising for electronic scholarship; new conventions are forming as scholars experiment with the new medium and discover how it can best meet their needs.

Let us put these problems aside for a moment and consider the other approach to the crisis: Doing nothing. As many established scholars have realized, *their* livelihoods are not really at stake in this struggle. Stanley Fish, Peter Elbow, and, for that matter, Stephen King, will always find a print publisher willing to accept their manuscripts. Members of the "Invisible College" or disciplinary elite have no problem getting their works published in print and can dismiss those who can't as unimportant anyway. A professor whose appearance in the top-tier print journals is as regular as rain in April sees little reason to bother herself with this talk of a digital revolution. "Computers," she snorts, "what good are they? Did Aristotle have one? Shakespeare? Darwin? Hemmingway?"

Even today, almost a century after Henry Ford rolled the first Model-T off the assembly line, a good rhetorician can make a damnably good case for just sticking with the horse.

Format Wars and the Hundred Year Question

While we can write off many objections to the electronic paradigm as habit or simple Luddism, others cannot be so easily dismissed. Two serious objections that must

be taken seriously are the permanence and accessibility of electronic documents. Seth Katz asks the million (or perhaps, trillion) dollar question:

> Print is solid and, at the least, durable for centuries. How do we know that the digital archive is reliable for periods of 50 years or more? What if online text-representation formats change and your electronic thesis or article text becomes unreadable? (12)

This question is the subject of *The Digital Dark Ages II: When the Digital Data Die* by Bryan Bergeron. According to Bergeron, the United States is poised to "enter a second Dark Ages—a time when what we leave behind will seem negligible compared to the previous centuries" (XXVI). Will we have reliable access to electronic scholarship one hundred years from now? If war, famine, or pestilence destroyed our culture, what percentage of our cultural artifacts would be available to researchers a *thousand* years from now?

Preserving digital information offers challenges distinct from those faced by archivists of printed materials. If I find a book lying on the sidewalk, the chances are good that I can either read it myself or have it translated. With the exception of my eyeglasses, I do not require any other technology to read a book. Even if the book is written in another language, given enough time and access to a good foreign language dictionary, I can unlock some, if not all, of its secrets.

If I stumble upon a CD-ROM lying in the grass, however, my knowledge of its contents is limited to what might be printed on its label. I will need a computer equipped with a CD-ROM drive if I hope to learn more. If I place it into my computer's CD-ROM

drive and receive only an error message, my quest is likely over. In a world without computers, CD-ROMs are merely coasters—no human being can "read" this disc just by staring at the magnetic depressions blazed onto its surface. Even "older" technologies like cassette tapes and phonograph records suffer the same problem; a complex device is required to harvest any of the information stored on these media.

Many people mistakenly believe that their music CDs will "last forever," and be playable fifty years from now without a hint of erosion. This is far from true. Indeed, the longevity of the newer media pales in comparison to that enjoyed by ancient scrolls. Using ultra violet light and plenty of computing wizardry, scientists were able to recover some of a 10th century Archimedes' text from a vellum scroll that had long been washed off and covered with religious texts by Byzantine monks in the 13th century (Browne A27). On the other hand, a study by the National Institute of Standards and Technology found that, even under optimum archival conditions, a recordable CD or DVD would be lucky to survive "for several tens of years" (Slattery et al. 523). These examples suggest that the "antiquated" medium is far more durable than the "high tech" solution. "Where a book can be left on a shelf and in 100 years' time, dusted off and read," writes Kelly Russell, "CD-ROMs will require a plan for immediate attention if they are to be accessible after even a decade" (5). According to Russell, most of the claims we have about the longevity and durability of storage media come from the manufacturers themselves and may be exaggerated in their favor. Independent research suggests that magnetic media is reliable for ten to thirty years depending on how well they are maintained (Russell 12). Even with the best storage technologies and optimum care,

Russell reports that the media will be eroded beyond recovery after a hundred and twenty years. "One hundred twenty-one years may seem a long time," writes Russell, "but it is not a long time in preservation terms" (13). Russell compares a well-preserved WORM backup cartridge to the *Book of Kells*, a vellum document that has lasted hundreds of years (13). Most of our digital media is simply not built to last.

Another, perhaps bigger, problem is whether the data stored on such media will be accessible by future hardware. We must separate the preservation of the *medium* from our ability to access the information *stored* on that medium. A digital magnetic tape in perfect condition containing precious information on the Vietnam War collected by the U.S. Department of Defense is just as inaccessible to me as that stored on a single shard of a lost CD-ROM. According to Bergeron, the special computer equipment required to read this magnetic tape is terribly obsolete and simply no longer available (4). Bergeron argues that hardware and software manufacturers have recklessly supplied users with proprietary technologies whose secrets are so well-kept that even a team of computer scientists would strive in vain to decipher the data encoded with them.

One might wonder why manufacturers would intentionally design products to be incompatible with their competitors' products or even their own future products. The manufacturers have concrete economical reasons for doing so. The software publishers can earn profits by forcing users to "upgrade" to new versions of their existing programs that are incompatible with the old formats:

> As a result of this practice, the new computers are largely incompatible with computers running previous versions of applications and operating

> systems. A database created with the latest version of Microsoft *Access*, for example, can't be read by an older version. What's more, without special utilities, it's impossible to remove *Access 2000* and install an earlier version of Microsoft *Access* on a computer's hard drive. (48)

Eliminating the "backwards-compatibility" option is a means of forcing customers to abandon old software and hardware and buy new products. However, sometimes manufacturers must sacrifice backwards-compatibility to keep down the costs of their newer products. Commodore's C-64 computer and their Amiga line had incompatible operating systems and storage media options. The C-64 was limited to 5 1/4" floppy disks whereas the Amiga was limited to 3 1/2" disks. Programs that ran fine on one machine would not run at all on the new; users either had to maintain both systems or abandon their old software libraries. The many people who sold their Commodore 64 to help pay for an Amiga faced the unpleasant fact that their old Commodore software was now inaccessible. To maintain backwards-compatibility, Commodore would either have had to include both sized drives on their Amiga computers or limited both to the lesser-density drive—to say nothing of the significant complexity involved with emulating the old environment in the new.

An example of media obsolescence is the Iomega Zip Drive. These special drives required a proprietary medium, the Zip Disk, which could hold up to 100 megabytes of information. Since CD-ROM burners were not yet readily available, these disks filled a sorely-felt niche. Soon Iomega released a Jaz Drive, which could hold 1000 megabytes on a different size disk (that was totally incompatible with the older Zip Drive). These

drives became quite popular for storing and moving large files like graphics or digital videos. Though popular for some time, writable CDs (and later DVDs) rendered them obsolete. Both the Zip and the Jaz drives are rarely seen on shelves today, and those who have significant information stored on these disks would be wise to transfer or "migrate" it to a newer medium. While this problem may be a small one for an individual user, a company or library faced with migrating the data from thousands of tens of thousands of obsolete storage media is much more significant. Frederic Potok and Marie-France Lebouc describe these situations as a "double technical problem well known to ETD specialists: the diversity of storage equipment on the market and their availability in universities" (81). Though a new storage media may offer convenience and affordability, no one can predict how long it will remain on the market.

According to Potok and Lebouc, this is not merely a technical problem, but also has deep political implications. Susan Hockey offers this enlightening, yet disturbing narrative of the hopelessness of the situation:

> The progress of too many retrieval and database projects can be characterized as follows. A project group decides that it wants to "make a CD-ROM." It finds that it has to investigate possible software programs for delivery of the results and chooses the one that has the most seductive user interface or more persuasive salesperson. If the data include some nonstandard characters, the highest priority is often given to displaying those characters on the screen; little attention is paid to the functions needed to manipulate those characters. Data are then entered directly into

> this software over a period of time during which the software interface begins to look outmoded as technology changes. By the time the data have been entered for the project, the software company has gone out of business, leaving the project staff with a lot of valuable information in a proprietary format that is no longer supported. More often than not, the data are lost and much time and money has been wasted. (20)

"The investment is clearly in the data," writes Hockey, "and it makes sense to ensure that these data are not dependent on one particular program but can be used by other programs as well" (20). Bergeron warns that "once the original text has been converted into machine-readable language, it may be impossible to reconstruct the original operating environment" (15). Russell warns that "if digital material is dependent on a particular software application and operating system environment, the life span of the digital storage medium […] may prove to be inconsequential" (13). My 90s-era Commodore Amiga computer could display images in HAM (hold-and-modify) format, which relied upon some clever hacks with the video processor to display up to 4,096 simultaneous colors (at a time when most high-end PCs were limited to 256)[13]. Of course, since they rely on some quirks of a particular and out-of-production video card, HAM images are incompatible with modern PCs and must be converted before they can be viewed. This problem of incompatible platforms has always been with software developers from the very beginning. Developers have often needed to "port," or translate, the code of their programs for use on other computing platforms. The ease with which

[13] See http://en.wikipedia.org/wiki/HAM

this process can be performed is called "portability." Before the rise of the web, proprietary software developers like Electronic Arts attempted to create a standard format for graphics, sound, and animation files by sharing the format's specifications with the rest of the industry. Electronic Arts, a game developer, created the Interchange File Format (IFF) to increase the portability of their products[14]. Once the standards were created and adopted, porting software among divergent platforms becomes far less expensive. Developers created "engines" for each platform that could handle the standardized formats. The web has fostered the development of several "universal" image formats, such as GIF, JPG, and PNG, but there is no way of knowing for sure if these formats will remain viable in upcoming decades. No matter how appealing a new format may appear, archivists must take its long-term viability into consideration. Digital preservation requires more than just storing disks in a cool, dry place. Computer hardware and software becomes obsolete quickly and may fall out of production in under a decade.

The problem is exacerbated with the complexity of the digital information. In most modern PCs, a single character of text can be stored in only one byte, whereas relatively small graphic images may occupy a thousand bytes (a kilobyte). However, to preserve formatting codes and the like, most modern word processors do not save documents as collections of characters, but rather in binary formats. Images are necessarily stored in binary formats, usually implementing some form of proprietary compression to reduce the file sizes or increase the clarity of the image. In short,

[14] See Jerry Morrison's "EA IFF 85" for more information about IFF: http://www.szonye.com/bradd/iff.html

advanced layouts, graphics, images, and videos decrease by whole orders of magnitude the likelihood that a given document will be easily viewed on a different platform than the one for which it was built. It would make much more sense for scholars to publish their work in an open format, such as simple ASCII text (the approach taken by the Gutenberg Project), HTML, SGML/XML, or PDF. The wider the adoption of a given format, the more likely it is likely to remain usable (or portable) in the future. Access to the format's specifications (the code that tells the computer how to display the data) is a key factor in maintaining accessibility. While pictures, animations, and sounds could be included in the archive, but the "straight text" version would remain separate so that in the event of future compatibility problems, at least scholars could access the text. Susanne Dobratz writes in the *ETD Guide* that

> Librarians always tend to think in decades; document formats like TIFF, Postscript or PDF do not meet their requirements. If PDF is replaced by another de facto (industry, not ISO-like) standard, preserving digital documents would mean converting thousands of documents. ("SGML/XML Overview")

Dobratz prefers the more standardized SGML/XML format. The advantages are numerous—it is simple, easily read by machine or human, and has the full support of W3C, the World Wide Web Consortium that chooses standards for the web. An important point about XML is that it is not a fixed language like HTML, but rather a "metalanguage," or a "language for describing other languages" (Flynn, "FAQ"). XML lets users design their own customized markup languages to accommodate their needs.

Peter Flynn, editor of a popular "Frequently Asked Questions" webpage about XML, writes that "proprietary data formats, no matter how well documented or publicized, are simply not an option: their control still resides in private hands and they can be changed or withdrawn arbitrarily without notice" (Flynn, "FAQ"). Though proprietary formats like PDF and DOC are probably more familiar to students authoring theses and dissertations, converting these formats to XML will help ensure their longevity. It seems inevitable that the digital formats used to store text and data now will be incompatible with the newer and better machines of the future. We have seen this happen quite frequently even in the few decades that computers have been available to us. The history of computing is full of disappearing platforms and the havoc these losses have for the archiving of software and data. We must take the "Hundred Year Question" seriously when making decisions about electronic scholarship. Open, vendor-independent, and simple formats like SGML/XML seem the wisest choice from the archivist's point of view.

John Eaton writes that "the tension between libraries' two-fold responsibility of providing access to and preserving information takes on particular significant with ETDs" (2). One might think that the university should, regardless of cost, maintain at least one printed and bound copy of ETDs in the event that something catastrophic happened to its computer system. No matter how well preserved, magnetic storage media erode with time and become unreadable. Russell points out that while making hard copies might offer a temporary solution, "For the longer term, space constraints and increasingly cost-effective methods for digital storage will make reliance on hard copy expensive, impractical, and ultimately desirable" (16). There is also a greater issue—many forms of

new media, particularly interactive elements and animation, are not reducible to paper. If students are now allowed to produce novels to satisfy their dissertation requirement, we can well imagine future scholars producing digital simulations. These dissertations will require not only intact data but access to the original hardware and software environment to execute properly. Preserving these files will mean not only periodically copying and porting them to future computer systems and media, but also emulating the hardware and software environment they require. Several unauthorized and potentially illegal emulation systems already exist for the modern PC and are capable of emulating a host of antiquated computers, game consoles, and arcade machines.

The emulation of proprietary operating systems and hardware may violate certain copyright and patent laws, yet it is critical for the long-term preservation of digital media. Michael Lesk, a professor of library and information science at Rutgers University, writes that "copyright is always a problem" when archiving new media ("Preservation"). According to Lesk, "A library may well be able to preserve something only by copying it, but may have difficulty obtaining permission to do that" ("Preservation"). In some cases, copyright or patent holders of an important digital format, application, or operating system may have gone out of business and it may be impossible to find them to ask permission—or perhaps, for whatever reason, they may simply refuse to grant it. Even if the author of an ETD releases the work under a public license (or even dedicates it to the public domain), the software vendors whose products she relied upon to produce the work may not be so forthcoming. There are few "free" format options available for sound and animation, though some are finally emerging and will be discussed shortly.

Whenever possible, scholars should select a free format over a proprietary format if for no other reason than to avoid legal problems with emulation and preservation.

Let us consider for a moment a student wishing to incorporate video into her dissertation. She may argue that the best format to store this video is Microsoft's WMV, or Windows Media Video format, or Apple's MOV, or *QuickTime* video format. These formats allow for very good compression and resolution and are preferred by many professional digital video producers. However, they are also proprietary formats whose "secrets" are protected by copyrights and patents. No one but Apple or Microsoft is permitted to make player software for these formats, though third-party developers can of course seek licensing to do so. In a world where Windows Media Video format was king, Microsoft would effectively control the computer video industry and use this leverage to "lock-in" users to the *Windows* Operating System. As a corporation existing purely for profit, Microsoft also would have no real incentive to maintain backwards compatibility if it decided to release a new version of its player and file format. Such bridges have often been burned in computing history by companies hoping to force consumers to switch to a new system and leave behind what cannot be salvaged[15].

Now, if Windows Media Video format were an open format, the problem would be resolvable. No matter what happened to the Microsoft Corporation in the future, if other developers had access to the format's specifications, they could easily build their

[15] The European Commission's "March 24, 2004 Decision" contains quotations from several internal Microsoft memos that illustrate "vendor lock-in." The quotations are from Aaron Contorer, general manager of C++, to Bill Gates: "The Windows API is so broad, so deep, and so functional that most ISVs would be crazy not to use it. And it is so deeply embedded in the source code of many Windows apps that there is a huge switching cost to using a different operating system instead" (126). These lock-in tactics are an intentional strategy employed by Microsoft to defend its market share.

own players—or, more likely, conversion software to upgrade or update the files into a newer, more universally compatible format. While clever programmers may eventually be able to reverse-engineer the player software, the reverse-engineered products are seldom as accurate as the original version. Access to the player's code is vital for total compatibility and will undoubtedly become more critical decades from now.

Unfortunately, free video formats have been a long time coming. Perhaps the most promising is Xiph.org's *OGG Theora* codec. This codec promises consumers a method of compressing videos without fear of being "locked in" to a proprietary system. If and when this format finally becomes available, I would highly recommend that scholars use it—for, no matter what happens to Xiph.org in the future, since the specifications and source code are freely available for the codec, other developers could ensure that the videos stored in this format are not lost[16].

In his book *The Future of Ideas*, Lawrence Lessig uses the familiar analogy of public highways to explain this dilemma. Imagine, for instance, if highways were owned by individual motor companies. The roads owned by Ford would permit only Ford vehicles; perhaps the roads could even be built in such a way to guarantee that non-Ford vehicles could not traverse them. In this situation, consumers would have to own multiple cars just to travel around the nation. This setup, while perhaps very profitable for one company, is not profitable for the industry as a whole, nor is it advantageous to the public. The present highway system, while still regulated, is not regulated in such a way as to favor one vehicle manufacturer over another.

[16] For more information on Theora, see this FAQ: http://www.theora.org/theorafaq.html

The software industry is well aware that consumers can be "locked in" to a vendor-controlled format and thus develop a strong incentive to continue using their products. However, as we discussed earlier with Electronic Arts' IFF, sometimes a corporation "opens" or shares the particulars of a proprietary format to create a standard that will advance the industry. We see this happening very clearly with Adobe's PDF (Portable Document Format). Adobe has published the specifications of the PDF format and has given blanket permission for anyone to make software that generates PDF files and has even agreed to offer royalty-free licenses to anyone wishing to use its copyrighted components (*PDF Reference,* 7*)*. Adobe's goal is to make PDF files the standard for electronic documents. While Adobe's software for viewing PDF files is free, *Acrobat 7.0 Professional* retails for $450, though a stripped-down version is available for less. While Adobe has much to gain if PDF in fact becomes the standard file format for online documents, the openness it has practiced regarding licensing help level the playing field level for other developers. Clearly, Adobe feels it is better for themselves and the industry if they create, share, and promote a single standard than to live with the chaos of thousands of incompatible, proprietary, and vendor-controlled formats. They have given permission for anyone to make software that accesses or creates PDF files as long as he or she abides by Adobe's licensing agreement.

One caveat of this agreement is that developers "must make reasonable efforts to ensure that the software they create respects the access permissions and permissions controls" for protection of "intellectual property" (*PDF Reference,* 7). Adobe argues that it has an obligation to serve the interests of copyright owners who demand protection at

the code level for their documents. So far, efforts to bypass Adobe's protective scheme have met with harsh resistance. Adobe charged Dmitry Sklyarov, a Russian programmer and researcher who built an application that allowed users to convert restricted Adobe eBooks into freely accessible PDF files, with copyright infringement and had him imprisoned. Adobe later backed off, stating that "The prosecution of this individual in this particular case is not conducive to the best interests of any of the parties involved or the industry" (Lemos, "Adobe"). Still, the willingness of Adobe to engage in such litigation against a researcher may cause administrators to question the sensibility of a campus-wide adoption of Adobe's software. Robin Gross of the Electronic Frontier Foundation states that Dmitry's "arrest says you can put computer programmers in jail for creating software that somewhere down the line could be used to make a copy of a program or digital book" (Lemos, "Adobe"). This fact might be particularly chilling for librarians struggling to make their holdings available online or digitally archive massive amounts of scholarly work.

The problems with document formats and codecs only illustrate a few of the considerations scholars must take when considering "going beyond text." A video file, no matter how well compressed, is nevertheless much larger in size than a plain text document. The same is true for sound files and images. Even though digital storage and transmission media is rapidly advancing and decreasing in costs, there are practical limitations that administrators must consider.

Even with advanced compression schemes, a full-length movie still occupies a gigabyte or more on a hard drive. The time required to download or upload such a huge

file is considerable, even with expensive T1 connections. We can easily imagine the chaos that would ensue if every author of a thesis or a dissertation felt compelled to produce a full-length documentary or video accompaniment.

The type of data that many new media enthusiasts demand, such as graphics, animations, and interactive segments, are very complex, often vendor-specific, and seldom fully portable. HTML code does not encode graphics; it merely indicates where the graphic file is located—the user's browser is then responsible for translating the binary code into an image. There is no way that someone could determine what the image was simply by staring at this code. One of the most popular proprietary formats for graphics intended for the web was CompuServe's GIF format. This format was popular because it could tightly compress image files and thus reduce storage space while increasing loading speed. However, CompuServe did not realize that an algorithm they used to accomplish such efficiency was patented by a company called UniSys. Fortunately, by the time UniSys got serious about suing the millions of infringers of its patent, it expired[17].

Electronic authors must make an important tradeoff when they go beyond regular text. Some of the most common programs used to generate graphics and animation store the finished files in proprietary formats. A good example of this type of program is Macromedia's *Flash MX*[18]. *Flash MX 2004* is the most common program used to create interactive or animated web presentations so popular with Internet advertisers. *Flash MX* stores these presentations in two files: SWA (a machine-readable binary file) and FLA (a

[17] For further reading, see the "GIF" article at *Wikpedia*: http://en.wikipedia.org/wiki/Gif

human-readable source code file). The SWA file is all that is needed to run the presentation in a web browser—however, without the accompanying FLA file, users are unable to see how the program works. Macromedia's SWA files are unplayable in popular web browsers like Microsoft's *Internet Explorer* and Mozilla's *Firefox.* They can only be viewed if the user downloads another program called a "plug-in," which interacts with the browser to display the animation. Unlike most graphics on the web, *Flash* animations cannot easily be copied and stored to the user's home computer. This "feature" ensures that most people will need to re-visit the website hosting the movie each time they wish to view it.

While Macromedia's player program is free and easy to download, *Flash MX 2004* is $500. *Flash MX Professional 2004*, which adds critical features necessary for, as the name implies, professional web development, is $700. Scholars who are willing and able to pay these prices for legitimate copies of the program will still be faced with the formidable task of mastering its complex interface and custom scripting language (Actionscript). For the vast majority of scholars, the costs and training necessary for the creation of useful *Flash* presentations are insurmountable. Like most businesses, they will find it more "cost-effective" to pay a private company to generate the necessary presentations. This company will almost certainly keep its source code and only distribute the binary file, much in the same way that an wedding photographer might keep his photographic negatives and force the customer to pay exorbitant prices for all prints and reprints. Macromedia has successfully created a new market and expects to

[18] Adobe recently purchased Macromedia, but it's still too early to tell how this will affect the industry. See http://www.forbes.com/infoimaging/2005/04/18/cx_ld_0418adbe.html

reap rich rewards for its efforts. These profits come at a cost—not only an economic cost, but also a cultural one.

What we see happening here is corporate interests gradually re-shaping the Internet to better accommodate their need to restrict access and control the means of production. While the original designers of the Internet intended website creation to be an easy and rewarding task, Macromedia (and many other companies and corporations) are working hard to introduce the same rift between producers and consumers that divides the world of print.

The software industry is full of other examples that illustrate the high costs of producing new media. The most popular software for creating and manipulating computer graphics is Adobe's *Photoshop CS*. This program, which is inarguably the industry standard, retails for $650. Like Macromedia's *Flash MX 2004*, Adobe's program also requires considerable knowledge and training which will likely greatly exceed the $650 for the software. Sony's *Sound Forge 7.0,* the industry standard for digital audio editing, retails for $400. Cakewalk's *Sonar 4 Producer* software, also widely used for creating music, retails for $950. Professional video editing software is also quite expensive; Adobe's *Premier Pro* 1.5 is $700. At such prices and complexity, these programs—which represent some of the finest tools available for the creation of new media—are simply out of reach for most scholars. Even without factoring in the additional costs for the super-fast computers and other equipment necessary to run these programs, we see that independent web development is soon to face the staggeringly

unfair competition faced by independent print publishing or film production. The corporate juggernauts will hold sway in this new, corporatized Internet.

However, concerned scholars and citizens can take actions to ensure to slow or perhaps even prevent the corporate takeover of the Internet. One absolutely vital step is to support open standards and free software alternatives wherever possible.

Free as in Freedom

Richard Stallman is perhaps the best known champion of Free Software. He does not privilege economic interests over the interests of men and women living in a free democracy. Indeed, he has often remarked that he would rather do without a program than sacrifice his freedom to use it. Perhaps Richard Stallman is most comparable to Martin Luther—but, first, I will outline what Stallman calls the "four freedoms" of software[19]:

- The freedom to run the program, for any purpose (freedom 0).
- The freedom to study how the program works, and adapt it to your needs (freedom 1). Access to the source code is a precondition for this.
- The freedom to redistribute copies so you can help your neighbor (freedom 2).
- The freedom to improve the program, and release your improvements to the public, so that the whole community benefits (freedom 3). Access to the source code is a precondition for this.

[19] See "The Free Software Definition" at http://www.gnu.org/philosophy/free-sw.html

The derivation of these freedoms from the "hacker ethics" defined by Steven Levy (see introduction) should be readily apparent. It should also be apparent how these freedoms can be adapted and applied to scholarship.

Stallman's efforts to secure these freedoms for software may seem of little interest to many scholars. Very few scholars know or care to know how to program a computer or modify a program's code to better suit their needs. They gladly leave these tasks to paid professionals. Even though such scholars may talk of a "computer age" or an "age of information," they discuss such issues from the sidelines. The very idea that they *should* take it upon themselves to learn programming is horrendous. The task is seen as too arduous, too expensive, too time consuming, or, most likely, simply irrelevant. As long as good companies like Microsoft are able to produce useful programs like *Microsoft Word* and *FrontPage*, why bother?

I hope that a paradox is coming into view. On the one hand, almost all scholars recognize that computers are allowing us to change our relationship to information. The enormous influence of the Internet on our society is impossible to miss. The National Telecommunications and Information Administration claim that computers are almost as common in American households as cable television ("Nation Online"). According to the same report, almost 20% of homes have high-speed broadband connections to the Internet. Yet most consumers have the same relationship to their computers as to their cable televisions: They stand on the receiving end of corporate production. Their experience is shaped and to a large part determined by the companies and corporations

who manufacture their software. To coin a term, they are "dead-end users" who simply do not know or care to know how to program their computers themselves.

Martin Luther faced a similar situation. In 1517, when Luther posted his theses to the door of a university chapel, very few people could read and even fewer could write. The most important work of literature, the Bible, was only available in Latin—a language that only clerics and a precious few educated citizens could decipher. One of Luther's driving ambitions was to change this situation by making the Bible more accessible to the public and charging them with the *personal* responsibility to interpret the work for themselves. Luther wished to subvert the power of what he deemed a corrupt and overweening administration of popes, cardinals, and bishops. Luther's well known assertion of "priesthood of all believers" was a serious threat to the Church's authority. Erwin V. Johanningmeier writes that "as individuals assumed the burden for their own salvation, they needed enough schooling to read and study the Scriptures for themselves" (5). The leaders of Protestant movements accordingly developed the first "compulsory and state-supported" schools and "entered into cooperative relationships with civil governments" (5).

Five centuries later, Richard Stallman and other advocates of the free software movement are saying the same things about software developers that Luther said about his Church. Whereas commercial developers wish to assume responsibility for all software development and carefully exclude the public from making key decisions, free software developers are encouraging the public to gain the skills necessary to create their own software. Andrew Feenberg observes that "the values of a specific social system and

the interests of its ruling class are installed in the very design of rational procedures and machines even before they are assigned specific goals" (14). The truth of Feenberg's claim is evinced quite strikingly by the web. The Internet, which, as I have previously stated, was built from the ground up to be as open and free as possible, has allowed teams of free software developers to work together to create powerful and competitive free alternatives to popular and useful proprietary programs. Linus Torvald's *Linux* kernel was combined with the GNU Project's free software programs to create a free operating system, which has since gained enough momentum to worry Microsoft chairman Bill Gates, who refers casually to free software programmers as "communists" in a recent interview at CNET[20].

In 2005, most people probably feel that learning to program is as difficult and unnecessary as many felt that learning to read was in 1517. If there is always a priest nearby to explain the difference between right and wrong, why bother? Nevertheless, thanks to Luther, I am able to read and write a dissertation at a public university. Thanks to Tim Berners-Lee and Richard Stallman[21], I am also able to use the Internet to share it with whoever might profit from reading it.

Economic Considerations

So far, we've discussed theoretical, technical, permanence, and legal issues of ETDs and electronic scholarship in general. What are left are concerns about cost. Very

[20] See http://news.com.com/Gates+taking+a+seat+in+your+den/2008-1041_3-5514121.html
[21] As many realize, the Internet is a network of millions of computers. The software that enables a computer to host websites is called a *server*. The most popular server software, *Apache*, is free software. For more information, see http://web-hosting.candidinfo.com/server-operating-system.asp

few scholars are left who doubt that electronic publication is cheaper than print. As I mentioned earlier, the cost of printing a scholarly book can cost $25,000 to $30,000 (including marketing). Compared to these figures, the cost of building an online archive of ETDs and making them freely available is negligible. Probably the most substantial cost would involve setting up the system. If the developers limited themselves to free software programs (a critical point), and provided quality documentation and tutorials for administrators and students, and utilized existing university Internet connections, the maintenance costs would be eminently reasonable. As Andrew Odlyzko points out, technology makes it possible for the scholars themselves to handle typesetting (there is no need to scan-in documents when the student could simply upload them to the server) ("Economics" 385). What editing was required could either be provided by the university or paid for by the student.

A common argument raised against requiring ETDs is the cost of training technicians and students. Scholars who cite high costs seem to assume that students lack even rudimentary computer skills and will require extensive training merely to be able to save or upload a document. The *ETD Guide* section on "Costs" calculates the total cost of staff, equipment, and software to be $65,000 (McMillan et al., 1). These costs are likely to drop even lower as cheaper software is developed and shared and technology costs decrease. Edward Fox argues that requiring ETDs will actually save the universities money: "The costly handling of paper TDs by personnel in the graduate school can be reduced or eliminated" (36). According to Fox, "It seems likely that at least one person in each large university can be freed to work on other tasks if proper automation takes

place" (36). There is no reason why the software built to handle the ETD submission process should be difficult or require special training. Indeed, the very definition of a quality user interface is that a program be as intuitive and self-explanatory as possible. The logical step is for several universities to share their resources to create a free stable, secure, and straightforward ETD platform. Such tasks, while seemingly overwhelming, are routine in the professional world of information technology. Submitting an ETD could be as simple as paying one's tuition online.

However, perhaps we are not looking at these things from the right perspective. So far, I have mostly discussed dissertations and other works of scholarship from the perspective of the print paradigm, and only lightly touched on what might be possible if scholars embraced the innovations possible only in electronic environments. It is all too easy to consider dissertations as fixed commodities. Just because a dissertation is stored in an electronic file rather than bound and printed does not necessarily mean that the text will change. A dissertation "On the Use of the Conjunction 'And' in the *Canterbury Tales"* will unlikely make an impact even if it is freely available online and catalogued in the NDLTD. The next and final chapter critically examines how dissertations *could* go beyond the print paradigm. What we will see is that the same features of ETDs that seem to offer the most radical breaks from traditional TDs also make them more difficult to archive and access.

Chapter Five

Future, Innovation, Frustration

There is a strong emphasis among advocates for the NDLTD for becoming "computer literate," that is, learning enough about software to take full advantage of the advanced technical features of computers and the Internet. Edward Fox writes, "There are two main types of ETDs. One type, strongly preferred since students learn (by doing) as they create them, are author-created and submitted works" ("What are ETDs?"). The other type is "vanilla" ETDs that are submitted to a company like UMI for processing. The student simply submits a file produced in a word processor or even a paper copy, which is "scanned in" and presented without any of the useful features typical of professional electronic documents. According to Janice Walker and Joseph Moxley, UMI creates ETDs using a "a bitmap scan" process which is "usually inferior in quality and functionality to an author-produced ETD" (115):

> The bitmapped image cannot be indexed and searched or analyzed, it doesn't contain functioning links, and it does not and cannot include audio or video files. In other words, the UMI electronic version of the dissertation is really no more than a photographic image of a print dissertation. (115)

Joseph Moxley writes elsewhere that UMI's version will be "inferior to the one you can prepare," and urges students to learn the technical skills necessary to create an exemplary ETD (90).

Scholars like Moxley, Walker, and Fox would like to see students not only make their theses and dissertations freely available online, but add features to make them more compelling and useful in their online environment. However, one of the primary reasons that American universities have resisted ETD requirements in their graduate policies is fear that the costs of the necessary training and equipment needed for the productions of ETDs exceed their value. While many scholars might agree that making theses and dissertations widely and freely available is a worthwhile ambition, encouraging students to "go beyond text" is seen as a waste of precious time and resources. Mired in the print paradigm, these scholars can't imagine what purpose a video, sound clip, or interactive feature might have in a dissertation. While a prejudice exists outside the academy that *print* lacks the prestige of these newer media, the prejudice inside the academy is that such features are, at best, frills, and, at worst, distractions. Indeed, many prominent scholarly journals are very plain, lacking cover art and illustrations. Compared to magazines, scholarly journals often seem almost purposefully dull and lifeless. To scholars, this presentation is not "dry" but rather "no-nonsense"; the material is serious and important, and anything that might distract from the text must be left out. Vicki Bennett, a former academic turned journal editor, argues that editors must carefully consider the relevance and utter necessity of including images submitted by authors: "If it is not immediately and abundantly clear why a particular image has been included,"

writes Bennett, "it can be useful to inquire what precisely the author hoped to achieve by including it" ("Visual"). Color illustrations can add considerable cost to a print publication, and those seen merely as "decorations" are usually omitted.

Scholars who argue for a "vanilla" approach to ETDs may be considered by some to be misguided, but there are practical reasons for limiting ETDs to text and simple tables and graphics. Consider Christine Boese's 1998 dissertation, *The Ballad of the Internet Nutball: Chaining Rhetorical Visions From the Margins to the Mainstream in the Xenaverse.* When I try to access this dissertation with *Firefox*, my web browser of choice, I am told that the page can only be fully displayed unless I install some missing plug-ins. The plug-in the site requires is Apple's *QuickTime Player*, a proprietary product which I actually already have installed, though, for whatever reason, *Firefox* refuses to acknowledge that fact. When I attempt to access the page with *Internet Explorer,* my browser crashes and I am forced to restart it. I try again, and this time I manage to access the page, but when I attempt to access the "Table of Contents," *Internet Explorer* alerts me that the window has attempted to open a "pop-up window." I give my browser permission to open the new window, and finally am able to start reading Boese's dissertation. All this seems like too much trouble just for the sake of a short video clip (which I am still unable to view).

These aggravations, however, are not the only ones. I find the "Table of Contents" window to be somewhat aggravating, and yearn for the option just to download the text and view it without this awkward interface. To make matters worse, if I click one of the three sections of Boese's "Works Cited" page, the "Table of Contents" disappears and I

am presented with a special pop-up window with no "Back" button. The only option is to close the window and start the whole process over. Tedious; yet *The Ballad of the Internet Nutball: Chaining Rhetorical Visions From the Margins to the Mainstream in the Xenaverse* is, according to *The Guide to Electronic Theses and Dissertations*, an "exemplary" ETD.

The pop-up window control scheme of Boese's dissertation is considered quite archaic by contemporary web design standards, which discourage the use of "frames." Indeed, they are almost as passé as the television program which serves as the subject matter of this dissertation. All of these problems could be corrected if Boese "updated" the dissertation, but we typically think of dissertations as finished products; permanent artifacts that should not be changed after the fact. There is another problem to consider. What if Apple's *QuickTime* video format becomes unavailable? Future scholars may lack the necessary conversion or emulation tools necessary to view an obsolete proprietary video format.

At what point do these "innovations" become simply added annoyances? Are there ways to "go beyond linear text" that do not compromise a reader's ability to access and archive the work? How can electronic scholars best take advantage of what the new medium has to offer?

Innovation or Frustration?

Most authors of ETDs do not attempt to "go beyond text." Indeed, their work is merely "scanned in" and converted to PDF in the method described earlier by Walker and

Moxley. These electronic documents can be archived and accessed online, yet the efficiency of this system leaves much to be desired. A computer cannot treat an *image* of a page as effectively as it can the text on that page. In short, we should follow the example set by print journals and books and ensure that there is a justification for "going beyond text" before committing ourselves to that end. We have not yet touched on the issue of whether these films will be any good or even worth the trouble. An English scholar writing a dissertation on Chaucer may argue that a long video of her talking head might make her ETD more innovative, yet would such an addition really add any scholarly value? While videos and sounds are certainly justified in certain situations (for instance, studies of theater, dance, and music), for the most part, text seems more than sufficient.

Perhaps we tend to think of video and audio as "innovative" because of the impressive results achieved by professional television and film studios. More people watch television than read books, magazines, newspapers, and especially academic journals. If we could "jazz up" scholarship by bringing in exciting features from other media, perhaps we could narrow this gap. Yet we often fail to realize the tremendous collaboration and cooperation required to produce even low budget films and shows. Years of study and experience are necessary to even master the art of lighting, much less camera angles, transitions, stock photography, and so on. Unless we are prepared to put a film crew at the disposal of a scholar, I doubt the results would please anyone but that scholar.

One example of a scholarly document that contradicts this dismal conclusion is Ruthanne Crow's 2002 master's thesis, *The Memory and the Legacy: The Whittlin' Whistlin' Brigade – The Young Company 1974-2001*. Crow's thesis makes good use of Flash cartoons to introduce and guide readers through her thesis about a children's theater group. Crow's cartoons are well-drawn and high quality, but we might wonder if creating them was time well spent. To put it simply, we can appreciate that Crow's humorous cartoons are fun to watch and were likely fun to create. Crow probably already had experience working with Flash and was eager to show off her abilities. We would be sour indeed to tell an aspiring scholar that she was not allowed to have fun with her thesis. Perhaps lightening the tone of theses and dissertations might increase their readership. On the other hand, there is no doubt that Crow invested considerable time making her cartoons. This time could have been invested in additional researching, drafting, editing, or revising—or they could have been left out completely and thus allowed Crow to finish her thesis in less time. Completing theses or dissertations seems challenging enough without feeling the need to enhance them with custom Flash animations. The point I'm trying to make here is that there seems to be a distinction between new media techniques that add scholarly value to a document and those that merely serve as decorations. While I'm not pompous or contentious enough to claim to know the difference, I recognize the dilemma of a thesis or dissertation director whose goal is to ensure that her students complete their projects within a reasonable time.

The best course would likely be for the director to ask the student to justify such additions and describe how they will help her reach her goals as a future scholar. Vicki

Bennett's criteria for including visual imagery in scholarly journals could easily be adapted for this purpose. Bennett argues that images submitted by authors with their articles generally fall into one of four categories:

1. The image represents the raison d'être of the manuscript.
2. The image is a crucial component of the research findings and correlated to the textual evidence.
3. The image, though not crucial, offers the reader valuable insight.
4. The image is essentially decorative. ("Visual")

Bennett stresses that these categories are not always mutually exclusive, nor can we always easily evaluate the relevance, utility, and usefulness of a given image. The director and student should consider which category to place the proposed image, animation, video, or sound file, then consider whether the ends justify the means. Of course, we should not recognize that the choice is not purely practical, but rather rhetorical. Will the addition have the desired effect on the given audience? Clearly, new media is an available means of persuasion, but it is not necessarily more effective than older, textual means.

However, there *are* features of online writing environments that are easier to implement and can and should be taken advantage of by scholars striving for innovation. While perhaps not as visually satisfying as Flash animations, the hypermedia features I have in mind should be easier to justify to members of the scholarly community. They involve collaboration and the forming of online communities to enrich a scholarly project.

Online Scholarship: Interaction and Collaboration

Simon Pockley's *The Flight of Ducks* online dissertation will serve as a useful example of the difficulties so often encountered in hypertextual scholarship. These difficulties are obvious the moment one enters Pockley's website at http://www.duckdigital.net/FOD/. Instead of a menu or table of contents, the user is greeted with an image of a man in a trench coat. Above and below this man are flapping ducks. Scrolling the mouse over these images reveals that each one will take the user to a different part of the site, though where they will take him is not clear. Pockley begins his dissertation by offering the reader a sort of maze—there will be no clear and visible path through this dissertation.

If the user clicks the image of the man, he is presented with a stanza of poetry. At the end of the bar, the word "facts" is underlined, indicating a hyperlink. This link takes the user to another stanza with another hyperlink. After a few rounds of this game, the user is taken to a screen with a duck on the left and an empty box on the right (I assume the image that is supposed to be appear in this box has been corrupted or deleted). Clicking the box, I encounter more poetry and more empty boxes.

Frustrated, I start from scratch and click the top duck instead of the man. At last I am presented with a menu. Here I am presented with a myriad of confusing options, but the "About" page is fairly straightforward:

> The Flight of Ducks is an evolving work. It is no longer just about past and present expeditions into Central Australia. It has evolved into a

> journey into the use of a new medium for which we have yet to develop a descriptive language. It is part history, part novel, part data-base, part postcard, part diary, part museum, part pilot, part poem, part conversation, part shed. (Pockley "About")

This language, which is as vague as it is poetic, is indicative of too many ETDs and works of online scholarship. As Pockley suggests, this genre is so confusing and abstract that we cannot even discuss it in "descriptive language." Is Pockley a scholar-poet or a quack?

While some humanists and even some scientific researchers may find Pockley's dissertation insightful or perhaps informative, I struggle to discover what truly makes it more useful as a work of scholarship than a more linear approach would have made possible. At times I feel like one staring at the Emperor's new clothes. Will I reveal my ignorance by confessing to see a naked fool where others see a king in such luxurious attire? I find that I must agree with the curmudgeon who insists that *good writing* makes for good scholarship; an animated GIF of a flying duck is merely a decoy, and the trial and error sessions necessary to understand how to navigate the dissertation may be entertaining for some people but simply frustrating for others. Of course, I am aware of the post-modern tendencies to draw our attention to the interface; to look *at* the hypertext rather than *through* it. I am not convinced that such tendencies, while justified in theory, play out well in practice, nor should every ETD or work of electronic scholarship be an experiment with interface. I recognize the possibility that I may simply not be down with Pockley's ducks.

However, there is one feature of Pockley's dissertation that shines as true innovation and demonstrates the scholarly potential of this new medium. That feature is the ongoing conversations that Pockley has with visitors to his site. Pockley has provided his email address so that anyone who desires can ask him questions or make comments about his project. Pockley publishes some of these messages and his replies to them on his website.

While some of the messages are merely compliments, permission requests, or technical questions, other responses are more profound. Pockley has even posted some full-length essays that readers have donated to his site—for instance, there is an article on bull-roarers from a visitor named Bethe Hagans that certainly adds to the value of the site as a scholarly resource. Pockley responded to the essay as follows:

> Many thanks for taking the time to send me this article and your previous message. I hasten to respond by way of acknowledgement but apologise [sic] that it will take me at least a few days to respond properly. What you have sent is fascinating and thought provoking - on many levels[22].

Pockley's later response was certainly just as fascinating and thought provoking as Hagans'. Pockley took the article very seriously and offered elaborate commentary. After asking several questions and providing his thoughts on her article, he writes:

> For now, I'll sign off, although you've prompted many other thoughts. I just wish I had more to offer you by way of insights or intelligence. Thank you so much for sending the article. I normally incorporate these kinds of

[22] See http://www.duckdigital.net/FOD/FOD1038.html#Bethe#8

> conversations into the Flight of Ducks. Have you any objection to this? Would I also be able to include your bullroarer article?[23]

Pockley has succeeded in building a community around his online dissertation. As Walker and Moxley put it, *The Flight of Ducks* "broke new ground with the potential to shift dissertators and their advisors from talking about the dissertation as being, ideally, *like* a social conversation […] to what happens when it *is* a social conversation" (111). Visitors flock to his site, adding their own contributions which are then integrated. This is clearly an important and far-reaching innovation. If such participation and integration continues, we can imagine that Pockley's dissertation will still be active and useful indefinitely.

Some scholars might posit that a "collaborative" dissertation like Pockley's is almost cheating. If we assume that a dissertation ought to be the work of a single scholar demonstrating his ability to conduct solitary research, then such a claim is hard to refute. However, many scholars and compositionists have argued that *all* writing is collaborative, and the question of authorship is always more political than anything else. Indeed, some have argued that single authorship is a logical distortion that often results in poor writers. Martha Woodmansee argues that "the assumption that writing is inherently and necessarily a solitary, individual act" is an error with a serious consequence: "We are not preparing students for the real writing tasks that await them" (24). Andrea Lunsford and Lisa Ede write that compositionists must create a "pedagogy of collaboration […] that would view writing as always shared and social; writers as constantly building and

[23] See http://www.duckdigital.net/FOD/FOD1038.html#Bethe#9

negotiating meaning with and among others; and evaluation as based at least in part on a 'range of selves' and on communal efforts" (438). Webtexts like Pockley's *Flight of the Ducks* demonstrate how such a pedagogy could be made technically feasible.

In many ways, the Internet was built specifically to enable this kind of innovation. LeBlanc argues that the future of "scholarly activity may be a more explicitly collaborative and communicative act that is ongoing, dynamic, and that does not necessarily have its greatest value in an eventual print form" (119). Pockley's dissertation is a great example of such activity. It's easy for Pockley to incorporate readers' emails into his project and thus enrich his dissertation. This task would be much more difficult if Pockley had published his work as a traditional printed book instead; while he could conceivably publish newsletters or new editions of his work to accommodate the added material, this practice would soon become prohibitively expensive. Likewise, if Pockley had released his dissertation as a "vanilla PDF," that is, a paper document that had merely been scanned in and stored in a bitmap file at UMI, this type of collaboration would be quite unlikely. UMI would find it inconvenient and expensive to constantly update one of the PDFs stored in its database, and there would be little financial incentive for them to do so.

Nevertheless, the collaborative possibilities enabled by the Internet seem to offer the best ways to innovate scholarship. The technique Pockley has applied is only a hint of what is possible with more advanced web technologies. A tech savvy scholar might wonder about the possibilities of creating a dissertation using the latest content management system software, which would make updating the pages easier and provide

added features like discussion forums or comments. Content management systems (CMS) like *Drupal* automate many of the processes Pockley must perform to publish letters and discussion and add search and other valuable features. Others might ponder the possibility of publishing a blog along with the dissertation. This blog could document not only the author's interactions with her readers, but even discuss her development of her project. A dissertation author could write out her chapters as blogs and encourage her committee and the public to post commentary or ask her questions. This ongoing blog would serve as a tool to help her write her dissertation.

Mario Biagioli describes how the CDF, or the group of scientists working with the Collider Detector at Fermilab publish documents:

> When a subgroup of CDF wishes to publish an article or to present a conference paper, the text goes through three rounds of internal review. The first is a preliminary approval from the publication committee, the last two take place on CDF's internal webpage. The text is posted and all members of the collaboration are asked to comment electronically. After comments are sent and answered, a revised version is posted and the process starts again. After two rounds of revision, those whose name is on the Standard Author List may withdraw their name from that publication if they are dissatisfied with the end product. (272)

The CDF has found a convenient way to handle the authorship problem. Individuals exert authorial power only by *withholding* their name and thus refusing to accept responsibility for the publication. In a way, the CDF's scheme, with its cycles of revisions, comments,

and shared authorship, is similar to what occurs in wikis. Wikis, a type of online writing environment built specifically to enable effective collaboration, has exciting and far-reaching implications for the future of dissertations and scholarship in general.

Adapting Scholarship to the Wiki Way

In the first chapter of this dissertation, I listed Steven Levy's list of "Hacker Ethics," ethics that were derived by early computer programmers trying to find the most efficient way to build effective code. Hacker ethics privilege openness, de-centralization, and the "hands-on initiative." These principles aren't merely philosophical; they represent an effective means of managing large programming tasks and allowing for future innovation. Programmers don't always know how clever people will use their programs. Someone may find, for example, that a mathematical application intended to calculate prime numbers can serve as a tool to test the integrity of computer memory[24]. It also true that programs work more efficiently when they are allowed to freely send data back and forth across each other (whether globally or locally, perhaps within a department). In general, the more open the computer and software architecture, the better individual programs are able to work. Indeed, one of the key problem computer engineers are struggling with now is the best way to eliminate the central processor unit, or CPU, in personal computers and design a more open and shared architecture for computing. In general, hackers resist control schemes were power is invested in one central authority and the "ends" are ignorant. A close study of an advanced programming language such as

[24] This is precisely what happened with the program "Prime95." For more information, see http://www.arsfoodcourt.com/modules.php?op=modload&name=News&file=article&sid=458

C++ reveals that, from a purely computation perspective, the "objects" should be "smart" and, to the extent that one is required, the "core" should be as small and simple as possible. In other words, a programmer doesn't want the bulk of a program's functioning to be stored in one central place, but would much prefer to have this functioning spread out, with each "object" working with other "objects" to perform some critical part of the overall task at hand. C++ and other modern programming languages are called "object-oriented programming languages," or OOP. Though a full description of OOP would take time to unpack and is beyond the scope of this dissertation, suffice it to say that the most advanced modern computer languages are not linear structures but are instead systems in which "objects" interact with one another to perform tasks. Stephen Prata, author of the *C++ Primer Plus*, argues that one of the key strengths of C++ is "that it lets you easily reuse and adapt existing, well-tested code" (15). Every C++ compiler includes a freely usable code base (the STL), and many more free libraries are shared online to help other programmers build large applications[25]. Familiar OOP concepts like encapsulation, abstraction, polymorphism, and inheritance are all meant to facilitate the sharing and reusing of code.

The Internet was built on these basic hacker principles of de-centralization and openness. William Ames, author of a book on digital libraries, explains that the TCP/IP protocols that run the Internet were designed by Vinton Cerf and Robert Kahn to be free and independent of any vendors (25). This freedom and autonomy from commercial control is responsible for the wonderful coherence of the Internet. "There is a striking

[25] Two examples include SDL, Simple Media Direct Layer, and OpenGL. Both libraries are useful for creating portable multimedia projects.

contrast between the coherence of the Internet […] and the mess of incompatible standards […] in mobile telephones," writes Ames (25). If the network of towers and satellites that drive the cell phone industry were freely shared instead of privately owned and controlled, consumers would benefit from much better service and compatibility. The short-sightedness of private corporations, however, prevents the formation of a "commons" from which they all might benefit. Except in the unpleasant event of a giant merger, individual cell phone service providers must compete with each other and restrict access to their part of the communications network.

Larry Lessig's *The Future of Ideas* describes how the creators of Arpanet, the progenitor of the modern Internet, wanted to build a communication network that was so de-centralized that it could survive a nuclear war. Such an "end-to-end" system would by necessity have to avoid "processing centers" whose destruction would bring down the entire system. The solution to this dilemma was to create a network whose intelligence was located on the terminals and not in the network itself. When someone sends an email, it does not first arrive at a "central email computer" which processes all email and then sends it out to the specified address, nor does the network know what kind of data packets are being sent along its system. It merely sends them across its wires towards their destination, which is a computer with the intelligence to interpret the data for the user. Perhaps the easiest way to imagine this system is to compare it to cars on a highway. The highway is "dumb;" there are no computers or sensors built into it. Instead, the individual drivers are expected to be smart enough to get to where they need to go. One can imagine how different things would be if instead of highways we had a

centralized transit system where the intelligence was built into the network rather than being left to the driver. Under such a system, a citizen might need to explain to a computer why he needed to travel across the city, and perhaps be refused if the authorities deemed his trip unnecessary. If he were allowed to go, he would merely step into a pod or some other contraption and be whisked away automatically.

Though such a centralized system may have its advantages, it simply isn't practical. If it were ever put into place, we can easily imagine the chaos that would ensue as various parts of the system malfunctioned or violent riots occurred over access. Furthermore, if someone were killed traveling via this system, the fault would like with the entire system, whereas a wreck on the highway is usually the fault of only one driver.

The analogy of the Internet to an "information superhighway" is wonderfully apt. Like the highway, the Internet applies rules only neutrally. For example, it is against the law to ride a go-kart on the highway, but as long as a vehicle is properly registered, it can ride on the highways without being discriminated against. The Internet works the same way. In fact, the Internet doesn't know if a data packet contains email, an image, or an MP3 file. The Internet is thus unable to prioritize certain kinds of packets. The end result of all this is that the Internet has the potential to become a vast, rich public "commons" from which the entire world could participate in and benefit from immensely.

Lessig's concern is that new online technologies and government legislation are threatening to turn this commons into a tightly controlled medium little different than cable television. Part of the threat is at the *code* layer; corporations find ways to use software code to ensure that users are kept as passive receivers and must pay for access.

The other threat is at the legal level; corporations lobby Congress for extended power to enforce "intellectual property" rights. One key piece of legislation that illustrates this is the anti-circumvention provisions of the Digital Millennium Copyright Act (DMCA). The provision states: "No person shall circumvent a technological measure that effectively controls access to a [protected work]" (DMCA, Sec. 1201 A). This provision makes it a federal crime to bypass or reverse engineer software code designed to restrict access or copying of protected materials. In other words, these provisions allow corporations to legally enforce whatever code-based protection scheme they have created, regardless of fair-use. The new copyright act gives copyright owners despotic powers undreamt of before the rise of the Internet. Whereas law does not prevent me from purchasing a book and sharing it with friends and family, the DMCA makes it a federal crime to share an e-book.

I have already mentioned some tools corporations are using to negate the freedom of citizens on the net. One is the preponderance of web sites relying on Macromedia's *Flash* to create web pages that cannot be legally copied or modified. Proprietary e-books are another example. If this trend continues, the Internet will soon cease to be a public writing space and become simply another form of "top-down" entertainment, where a handful of huge global corporations entertain a passive and thoughtless mass of ill-informed and voiceless citizens.

A few web technologies stand in direct contrast to this passive model and make participation and collaboration easier than was possible in the early days of the net. Some of the more recent web technologies to emerge are online discussion boards, blogs, and

wikis. These tools make publishing and interacting with other people simple; there is no need to learn HTML, CSS, SGML/XML, or FTP. Though all three technologies are exciting and have much to offer online scholarship, I believe that wikis have the most to offer. Wikis are the only online writing environments that truly embody "hacker ethics" and remain true to the original intention of the Internet's creators that this new way of receiving *and sharing* information would be free and accessible by everyone.

The first wiki appeared in 1994 when programmer Ward Cunningham had a need for a "quick way to collaboratively publish software patterns on the web" (Leuf and Cunningham 15). This desire led to the creation of the first wiki server. Ward Cunningham and Bo Leuf describe wikis as a "free-form solution," a "simple, open, and *non-proprietary* storage solution" (12). Wikis differ significantly from other online writing environments which allow authors or site-owners to display material and dictate the terms users can access or interact with it. Leuf and Cunningham describe wikis as "inherently democratic—every user has exactly the same capabilities as any other user" (17). Thus, wikis are very much in line with the "hacker ethics" discussed earlier; they allow users access to the system, allow all information on the wiki to be free, de-centralize control, and in a way that we will now explore, hold users to the criteria of intense peer review rather than the "bogus criteria," such as degrees or position, that hackers passionately detest. Of all the online writing environments currently available, wikis seem best able to realize the future envisioned by Stanley Chodorow:

> The future world of scholarship that I am envisioning is one in which collaboration will be the norm, even in fields that are now the province of

> sole practitioners. It is also one in which the information used by the teams of scholars will be in liquid form. The electronic format encourages constant change—addition, subtraction, alteration—and its organization is fundamentally different from the one used in printed materials. (6)

Wikis differ strikingly from other online writing environments that still allow, to greater or less extent, the same top-down control of documents of print. Earlier technologies, which were loudly praised as eliminating the barrier between author and reader, ultimately preserve authorship. For example, a blog is generally authored by a single person—visitors are only free to add comments to the bottom of each post. At best, visitors can *add* comments, but not edit or delete existing material. A forum allows for more equal participation, yet individuals can still claim authorship of their individual posts; no one is free to edit someone else's post. From an authorial perspective, static HTML or SGML/XML is similar to print; the visitor can access the material on the site but has no power to change it.

Probably the best example of a wiki today is the famous *Wikipedia,* located at http://wikipedia.org. Jimmy Wales founded *Wikipedia* in order to create a publicly authored and edited web encyclopedia. Since the site appeared in 2001, users have contributed over 1.3 million articles, 470,000 of which are in English ("Wikpedia"). The site is well-indexed in the popular search engine *Google*, which helps generate some of the 80 million hits that *Wikipedia* receives daily.

Anyone is free to edit almost every entry in the *Wikipedia.* Only vital pages such as the homepage are protected from casual editing. An obvious question is whether or not

this freedom results in rampant vandalism or unreliable information. The beauty of *Wikipedia* is that while anyone is free to damage a page or insert nonsense into a quality entry, everyone else is free to repair that damage. Thus, the intelligence of *Wikipedia* is not located in a central authority or in the software itself; rather, it is located in the "ends," that is, the users of the system. *Wikipedia* works for the same reason public highways work. Even in a situation where every third car was a police interceptor, a determined driver is free to intentionally wreck his car or cause havoc on the highway—and, indeed, fatal crashes occur everyday and can stall traffic for hours. There is no "code" in place to *physically* restrict a drunken driver from entering his car and endangering the lives of everyone else[26]. The highway has no built-in intelligence or sensors to prevent drunks from driving on it. Even if police cars spot the drunk, they have no mechanical way of forcing the car to pullover. Instead, they must often perform a long and dangerous chase to isolate the individual and arrest him.

Nevertheless, despite these very real limitations, the system works fine most of the time. Sensible drivers are aware that it is ultimately in their best interest to drive safely and courteously, regardless of whether there is a police car nearby. Strong social pressure and common sense are enough to keep most people from leaping into their vehicles and recklessly careening down the highway. A concerned motorist witnessing such a driver might feel compelled to use the frequently-posted state trooper mobile phone number to report the driver. In short, since the highways are a public resource that

[26] There are devices such as *Interlock* which will keep a vehicle from starting until the driver inhales into the mechanism, which performs a breathalyzer test. However, this only limits an intoxicated person from driving that particular vehicle. For more information, see http://www.sens-o-lock.com.

everyone must use, very few motorists feel compelled to intentionally damage or reduce the quality of that resource.

An important point to make here is that even though a wiki page may be unprotected and modifiable by anyone, it cannot be destroyed or deleted. Wikis use a technique called *versioning* which automatically saves the current state of a page in a database before replacing it with the updated page. Thus, with a few simple clicks, the user can access not only the most recent page but also the previous versions. Most wiki servers also add a discussion feature which allows wiki authors to describe or attempt to justify their changes. These versioning and discussion features have very important implications for scholarship.

Let us briefly compare the difference between a wiki page dedicated to "scholarly method" and a similar article that might appear in a printed scholarly book. Both are collaborative in the sense that even if the print article has a specified "author," that author must have conducted research and worked with professional editors and reviewers before the book ever arrived at the press. For the sake of argument, let us assume that both the wiki page and the book article are of the same length, express roughly the same ideas, and are of comparable stylistic quality. Let us also assume that the presentation method (online versus print) is not at issue. Given these conditions, it seems that the most significant difference between the two is the factor of accountability.

Foucault's essay "What is an Author?" can help us understand what we really mean when we say the printed book has an author. Even though the author may have collaborated with editors and reviewers, he has put his name on the document and thus

has staked his reputation on its excellence. If the information turns out to be bogus, incorrect, libelous, or plagiarized, it's the author who will receive the blame. The reviewers may have very well been "anonymous" and thus are excluded entirely from responsibility, and the editor and publisher need not necessarily have any professional knowledge or interest in the subject matter. Foucault reminds us that authority is really a matter of power; it is a way to assign responsibility for a document to a person who must stand accountable for what goes out under his name. Many are the regretful authors whose careers and reputations have been shattered by an unfortunate bit of printed prose.

There is, however, a benefit to claiming authorship of a document. The author of an essay published in a prestigious academic journal is the recipient of a valuable token of academic success and merit. A hiring, tenure, or promotional committee is very likely to accept such a publication as key evidence of the scholar's professional competence.

In the case of the wiki article, no one can claim individual authorship. The article will likely have been edited, extended, and evaluated by countless anonymous users. While some of these users might have Ph.D.s and be legends in their field, their contributions are not automatically given more weight, nor are they allowed more control over the entry, than anyone else on the system. Indeed, Larry Sanger, one of the co-founders of *Wikipedia*, recently broke with Jimmy Wales over the lack of elitism on *Wikipedia*. In an article called "Why Wikipedia Must Jettison Its Anti-Elitism," Sanger writes:

> As a community, Wikipedia lacks the habit or tradition of respect for expertise. As a community, far from being elitist (which would, in this

> context, mean excluding the unwashed masses), it is anti-elitist (which, in this context, means that expertise is not accorded any special respect, and snubs and disrespect of expertise is tolerated). This is one of my failures: a policy that I attempted to institute in Wikipedia's first year, but for which I did not muster adequate support, was the policy of respecting and deferring politely to experts. (Those who were there will, I hope, remember that I tried very hard.) (Sanger, "Why")

"Deferring politely to experts," of course, is what is specifically resisted by hacker ethics and postmodern discourse. The obvious question becomes, "Who are the experts?" Very quickly we run into the sorts of legitimation crises elaborated by Jean-Francois Lyotard in *The Postmodern Condition*. Lyotard writes at the end of this "Report on Knowledge" that we must "give the public free access to the memory and data banks" (67). If knowledge is power, then allowing everyone to access, challenge, and create knowledge is a prerequisite for freedom.

Wiki Scholarship

What would a wiki dissertation be like? If a scholar approaches this question from the print paradigm, the answer is that such a project would be nothing like a dissertation. However, even a scholar willing to consider "new media" dissertations like the puzzling interface and multimedia components of Pockley's *The Flight of the Ducks* might question the efficacy of wikis for promoting good scholarly discourse. The same

problems that make wikis really good for some purposes make it appallingly unfit for others.

If we consider a dissertation as an original, single-authored document, wikis are simply unfit as a medium. Of course, the author could use code to limit what others could do to her wiki, yet doing so would defeat the purpose of choosing a wiki in the first place. You can use a wrench as a hammer, but why not just use a hammer?

What would happen if I decided to publish this dissertation in a wiki and make it freely available and open to participation? Lawrence Lessig has decided to do something very similar with his 1993 book *Code.* Lessig's goal is to solicit his readers to help him prepare an updated version of the book using a wiki. "What I found most interesting is that people outside of the academic world talk about [*Code*] and use it a lot," says Lessig (qtd. in Bazeley, "Professor"). "I was really trying to find a way to encourage them to contribute to [its] evolution" (qtd. in Bazeley, "Professor"). The wiki, located at http://codebook.jot.com, has already attracted hundreds of users, some of whom are quite active. Lessig has announced that the updated version will be published under a Creative Commons license, and all royalties (including the advance) will be donated to the Creative Commons (Bazeley, "Professor"). According to the official FAQ (frequently asked questions), the wiki authors are "focusing on correcting errors, updating material, and supplementing where absolutely necessary only" ("CodeFAQ"). The point is not to rewrite the book or change its tone, and one part of the website tells authors to "try to remain true to the book’s original style" ("Some Things"). Quickly browsing through the

existing pages, I noticed that most of them had been modified only once or twice. The most edited pages were revised 14 or 15 times, and the changes were minor.

Several interesting problems are presented by Lessig's *Code* wiki. Even though the finished document will likely be authored by many different people, it still uses first person, and in countless more subtle ways, strives to stay true to Lessig's voice. Readers are not asked to appropriate Lessig's discourse or change its argument. Since *Code* is a very opinionated and argumentative book, this resistance is understandable. It might also explain the lack of participation or real interest in the project. The recent changes listing of the wiki indicates an average of only two or three changes per day.

Perhaps one reason why Lessig's wiki hasn't attracted the attention of the *Wikipedia* is the narrowness of its scope. Lessig isn't using his wiki to argue or try to reach consensus about his argument; conceivably, the only persons who might participate in this wiki are people who generally agree with his convictions and wish to help him strengthen his argument with additional research. To get the full benefit of the wiki environment, Lessig might consider allowing or encouraging his readers to make more far-reaching and foundational changes to his text. Many potential authors are likely reluctant to edit this wiki for fear of disrupting Lessig's style or voice. Wikis like the *Wikipedia* or *WikiTravel* seem less personal and welcoming to all types of authors.

If I were to post the text of this dissertation in a wiki like Lessig's, I wouldn't ask readers to stay true to my voice or style. If a scholar in China wanted to change the text, I wouldn't stop her since I would want to take advantage of the wiki as a medium. If she made significant changes to the dissertation, I couldn't very well say that *I* was the sole

author of the wiki. I could add her as a co-author, but then I might end up doing that a hundred times as other authors joined in. Eventually, I could not with any accuracy say that the wiki was *mine*, except in the rather banal sense that I might have installed the server software or paid for the hosting. Essentially, I would face the same problem that Michael Perelman claims affects scientific researchers—"Nobody, absolutely nobody, can tell how much each participant contributed to the eventual outcome of any study" (121). Even Lessig, a law professor and copyright expert, admitted to *Mercury News* that he has "not figured out how to handle authorship and credit contributors" (Bazeley, "Professor"). However, the advantage of wiki software is that it preserves the "history" of all changes. Discounting what communication might occur offstage, a researcher could piece together each participant's contributions and determine the extent to which any one person authored the page in question.

We are making some huge assumptions here, but let us explore this a bit further. Putting claims of authorship aside for a moment, we should consider the inevitable changes a traditional dissertation would undergo in an active wiki environment. If countless users continued to tweak and edit a document like this dissertation, undoubtedly certain parts would flatten out. The "I" might become "We," and finally even this pronoun might disappear as would other signs of subjectivity. Persuasive arguments—i.e., the many position statements sprinkled throughout this dissertation, would become explications of multiple perspectives.

Let's consider an example. Perhaps a scholar might come across this hypothetical wiki and find a viewpoint that clashes strongly with his own; maybe he feels that I totally

misrepresented Foucault's notion of authorship described above. Now, if he were reading a print journal or book, he might write to me or the editor complaining about what he feels is a serious and misleading error. Or, more likely, he might dismiss the book as ill-informed and the author not worth taking seriously.

If the scholar discovered this same passage on a wiki, however, he might feel he has a responsibility to correct it or assert his contrary view. We can imagine the scholar feeling guilty if he allowed such an error to remain, where it might mislead countless readers and spread ignorance. In this circumstance, the scholar might very well edit the passage to better represent Foucault's thought. Furthermore, he might use the "discuss changes" feature to justify his edition: "You obviously haven't read Foucault's later work. I have made changes here to better represent his later thoughts on this subject." This kind of thing happens everyday on *Wikipedia* and can lead to thousands and thousands of versions as users struggle to reach consensus on a given topic.

In the context of a public encyclopedia, it may make sense to allow anyone to change an entry. After all, encyclopedias are supposed to contain unbiased, objective, and reasonably neutral descriptions of terms and concepts. The point is not that such objectivity has been challenged according to postmodern thought. The point is that most people take these qualities to be the guiding principles of encyclopedias. Someone might very well question the reliability of an encyclopedia entitled *The Right Wing Christian Encyclopedia*. We expect encyclopedias to represent what is most widely conceived as truth—not just by right wing Christians, but by the educated public and "experts." We imagine that the authors of encyclopedia articles separate "fact" from "opinion." An entry

on "Shakespeare" is not likely to include "The greatest writer in English" without some qualification; perhaps "A poet and playwright *widely conceived by scholars and critics* as the greatest writer in English." If we saw a claim like this made about Stephen King, we'd be far more likely to think it was an error on the part of a particular encyclopedia rather than a fault with the encyclopedia *as such*. An encyclopedia is not a place to make arguments or engage in debates, but rather to present generally accepted knowledge.

This fact is what separates *Wikipedia* from a print encyclopedia. It is at once a place to present generally accepted knowledge *and* a place to argue and debate about the legitimacy of this knowledge. Someone *can* change the Stephen King entry to say he is the greatest writer in English, or, indeed, of all time. If such a change stands, and is uncontested by the rest of the wiki community, it thus represents a consensus and is, from the perspective of that community, legitimate. However, such a controversial change is *very* unlikely to remain uncontested; a careful study of controversial changes and page histories of the *Wikipedia* reveals a pervasive tendency to "flatten" subjectivity and eliminate or qualify questionable claims or assertions.

Yet making questionable claims or assertions is at the very heart of scholarship—at least the type of scholarship we've come to value. We differentiate "information" from "scholarship" mostly based on whether or not the material advances an argument or puts forth unproven assumptions. We might consider a bibliography of Shakespeare criticism to be useful for scholars to use in the production of scholarship, but don't consider bibliographies to be scholarship. A concise and well-written summary of a play isn't

scholarship; yet a few pages that establish a new perspective or challenge an established interpretation of the play might very well represent excellent scholarship.

It would seem, then, that given the "flattening" tendency of wikis, and the definition of scholarship as the advancement of theses and particular points of view, a "wiki ETD" is an oxymoron. Just presenting the facts and summarizing arguments does not constitute scholarship—at least according to modern standards. Contrarily, historically speaking, a wiki ETD makes perfect sense. It is thus to history that we must turn to see how wikis can constitute sound scholarship.

Jay David Bolter tells us that Medieval conceptions of scholarship were heavily reliant on what he calls the "encyclopedic impulse." He writes:

> The encyclopedic impulse was strong in later antiquity, when editors produced numerous handbooks or miscellanies on subjects important to their culture, such as rhetoric, poetry, natural history, and medicine […] Philosopher-theologians produced *summae*, which were encyclopedic in ambition—attempts to join the major philosophical and theological traditions into a convincing whole […] The encyclopedic impulse diminished somewhat in the age of print. As books multiplied, it became harder to aspire to the goal of a book that would encompass all important works, even in a single field. (82)

Charles McClelland notices this characteristic as well. He describes how Gottingen professors working from 1756-66 published heavily, but how the quality of their works was "uneven, consisting of such diverse works as collected sermons, encyclopedic

compendia, disputations, and literary works" (83). One might also imagine McClelland's description of scholarship in 1756-66 Germany to apply as well to scholarship now being published on the web. For there we see the same hodgepodge of lectures, notes, arguments, "literary works," and, of course, the many encyclopedic efforts. Bolter's insight is that print technology's key feature, namely, the ease with which books could be published and distributed, caused a crisis in the Medieval paradigm of scholarship. Eventually it was simply impossible to compile all established knowledge or produce all but the most shallow *summae* of the works of any academic field. McClelland writes, "By about 1850 […] various conditions had combined to make the publication of research findings, and the ongoing process of research that led to new discoveries, a prerequisite for the successful professor" (171). McClelland attributes this change to the Romanticist movement, which ascribed so much importance to originality and the individual genius of authors.

My contention is that the Internet has brought about yet another crisis that may have the effect of bringing us back to the earlier, Medieval conception of scholarship and, for that matter, knowledge itself. The alternative to the print-based paradigm, and the resolution of the crisis in scholarship, is the wiki way.

I described earlier the problems I would encounter if I tried to write my dissertation in a wiki environment. The problem with such a scheme is not necessarily that the dissertation is full of errors or that the wiki is full of vulnerabilities. From the print-based paradigm, my dissertation might be entirely adequate. From the wiki paradigm, my dissertation is hopelessly subjective, original, and personal; the very

factors that make it fit the print-based paradigm make it incompatible with the wiki paradigm. If I really wanted to open this dissertation up to wiki-type collaboration, then I would need to strip it of all things personal and be willing to let others change the arguments and even open up my key points to debate. A published book is a place for the scholar to carefully control the message and offer up a good representation of what he or she believes about the subject and wishes to convey. A wiki is a place for scholars to work with other people in deciding on a message and representing what a group of authors—sometimes a very large group of authors—have agreed to convey. Wiki scholarship is a different kind of scholarship than most scholars are accustomed to producing.

What then, would make it fit the wiki paradigm? What would make *any* work of scholarship at all fit the wiki paradigm?

First, we must reject the print-paradigm. Specifically, we must shed ourselves of the idea that "true" scholarship is limited to what is original, creative, unique, and authored, either by a single person or a large group of people. We must also reject any views that the value of scholarship lies purely in its expression rather what it is trying to express. This is not to say that we must reject postmodern perspectives on knowledge; quite the opposite. What it means is that we understand that, at best, expression reinforces or makes a point of view more acceptable—that, ultimately, all such matters are rhetorical and are constructed and given value by communities rather than individuals. It is too much to say that underneath the expression there is nothing to express; that knowledge *is* simply the expression of knowledge. Such a circular definition serves no

purpose save the confusion of the issue. Pragmatically speaking, if there is nothing but language, we may as well go on pretending otherwise, because how can anyone *say* we are wrong? A scientist may insist that all science is merely a collection of theories and hypotheses that might all be proven pure nonsense tomorrow, yet, as Kuhn points out, she cannot reject science and still be a scientist. Whether or not evolutionary theory is *true* is not really what science is about; if the theory proves useful and provides a consistent and convincing description of a phenomenon, then it stands. If scientists begin running into serious trouble trying to apply evolutionary theory, and a competing theory arrives that solves these problems in a wholly winning way, *then* scientists may declare "Well, evolutionary theory *was just a theory*," and treat it as such. Until that moment arrives, it serves scientists' best interest to accept it.

This line of reasoning brings us back to one of the characteristics of the wiki paradigm: What *stands* is objective, what is deleted and forgotten is subjective. Whether or not there is some ultimate authority we can consult to verify the truth of something on a wiki is beside the point. Indeed, a discrepancy between an entry in the *Encyclopedia Britannica* and *Wikipedia* does not settle the case that the latter is wrong. If one were to explore the discrepancy; peeling back the layers of versions and justifications and discussion that brought it about, one might discover crucial and convincing evidence that *Wikipedia* has it right. However, my point is precisely that such a peeling back is ultimately a misguided quest. The point is that the community of wiki authors—which could be anyone who visited the page—has, directly or indirectly, established the legitimacy of the most current version. Otherwise, the page would be changed or *ought* to

be changed. Of course, whether or not it will be changed is entirely dependent on the goodwill and energy of the individuals who think they know better; yet, if they fail to take action the fact that the *Wikipedia* has it right does not change. If I discover incontrovertible evidence that Darwin's evolutionary theory is utterly wrong and devise a few more suitable explanation for the same phenomenon, yet fail to divulge it, as far as scientific knowledge is concerned, Darwin still has it right. Knowledge is only knowledge if a given community accepts it as such.

It is easy to imagine the *Wikipedia* improving as more and more skilled and knowledgeable people participated in its ongoing development. The entries involving rhetoric will improve as scholars of rhetoric join in the discussions and formations of entries. While one's Ph.D. is not enough to guarantee that one's changes will be accepted without question, we can hope that experts and scholars will be able to correct errors and enrich entries in a convincing and rhetorically effective way.

Wikis and the Future of Theses and Dissertations

Describing the legal and technical problems of online scholarship and the ownership of information is ultimately a discussion of the public university's obligations to the public that supports it. Looking back through history, we saw how the invention of the printing press and the manner in which it was employed to generate the most profits now stifles innovation and inhibits scholarship. We saw how code and advanced web features can enable, but also reduce, the effectiveness of scholarship. Finally, we

explored wikis and their potential to radically affect the future of knowledge and scholarship.

What is left, then, is an account of what would become of the thesis or dissertation that hoped to flourish under new paradigms. A few characteristics are obvious. Such projects might be or resemble wikis and be more collaborative and encyclopedic individual or argumentative. It should be clear, however, that these are macro-characteristics of wikis rather than micro-characteristics. At the micro level, there is of course a great deal of individual contributions, arguments, and debates. The goal of a good wiki author, however, is not merely to argue and propose changes, but to defend those changes well enough to have them incorporated into the wiki and accepted by the community.

Consider the free software community and the management of huge yet critically important projects like the development of the Linux kernel or APACHE server software. Imagine a budding programmer studying these codes and submitting some changes to the community. If the community were to accept these pages and incorporate them into the source code, then the programmer has unquestionably demonstrated his competence as a programmer. He has *contributed* in a visible and quantifiable fashion to the ongoing development of a famous and prestigious free software project. Since contributions are carefully recorded in these projects, the programmer could point specifically to the code he contributed and use his enhanced reputation to help secure profitable employment.

This model of contribution and reward makes perfect sense in the academy. Of course, here we wouldn't be developing a piece of software, but rather contributing to a

scholarly project or academic inquiry. We could imagine, for instance, a wiki dedicated to Shakespearean studies. The wiki authors might be composed of hundreds of scholars, stage managers, classical actors, playwrights—in short, anyone who had a professional or casual interest in the subject. Any project like this would always be under development; there is never going to be a "definitive" wiki. What if, instead of merely writing a paper dissertation that will be read and approved by a few committee members and stored in UMI's pay-for-use archives, a student demonstrated her competence by contributing to the Shakespeare wiki? Of course, what would count was how many and to what degree her contributions were accepted. Obviously, to make a convincing case for a change or contribution, the student would have to engage in quality research and work hard to justify her claims.

This idea grows more exciting when we wonder what might happen if the many scholars all over the world who are now writing dissertations and theses on Shakespeare were to unite their efforts in the enrichment of a Shakespeare wiki. Every participant would improve the reliability and value of the wiki as a scholarly resource. Understanding why a change was rejected might teach a scholar something of rhetoric and the establishment of an effective *ethos*. Can someone who cannot find a way to contribute to such a project accurately be called a *scholar*? We define a scholar as one who not only seeks knowledge but also contributes to it, and reserve the term *student* for someone who is still only learning.

An important fact that must not be overlooked is that a wiki community, like any community, is only as good as the men and women who compose it. A wiki inhabited by

sloppy and irresponsible authors will never amount to much. Likewise, a wiki with only a few authors will never be as comprehensive and valuable as a wiki with hundreds or thousands of authors. There is always the possibility that an otherwise promising wiki community will fail because of a lack of participation or too much participation from vandals and nincompoops.

Nevertheless, the academy wasn't built in a day, and, as plenty of the historical examples I have provided suggest, was long a chaotic enterprise. It took centuries to develop the print paradigm and conceptions of scholarship that now rule the university and differentiate scholars from teachers and students. Whether or not the academy will embrace a radical solution as I've outlined here depends on the seriousness of the problems now facing public universities, and whether these problems can be resolved without abandoning the print paradigm. Perhaps the forms of contemporary scholarship—books, articles, and increasingly academic conferences—can simply be relocated online. Perhaps proprietary software developers, academic publishers, and the government can successfully apply the "Intellectual Property" law that rules print to the web, and recover the binary opposition of author/reader that justifies this system. Digital Rights Management, or DRM technology, may allow scholars and publishers even better control of the dissemination of scholarship than was possible in print. Lessig writes in *Code* that "Cyberspace is about to give holders of copyrighted property the biggest gift of protection they have ever known" (127). Publishers and copyright holders of scholarly materials obviously have an interest in making these materials available to scholars, and the laws of the market would suggest that the prices will be kept low enough for most

scholars to enjoy access to them. Lessig's fear is that too much control at the code level will result in diminished rights of fair use—rights which are critical for the production of good scholarship. "When intellectual property is protected by code," writes Lessig, "fair use becomes subject to private gain" (135). Scholarship might never suffer a "blackout," but only a gradual dimming that slowly but surely leaves us lost and groping in darkness.

Far more likely is that the small groups of scholars now embracing new paradigms of scholarship will continue to do so. This small group will grow larger with each generation of enthusiasts—young scholars who will have never lived in a world without the Internet. These scholars will easily see what eludes so many scholars today and be unable to justify performing the kind of work I've performed here. Perhaps given another fifty to a hundred years, new scholars committed to new paradigms of scholarship will fill the ranks of hiring, tenure, and promotional committees.

Many scholars have speculated about what the future of scholarship might be in a digital world. Many of their predictions sound like textbook definitions of wikis. For example, consider Jean-Claude Guédon 's predictions:

> A kind of living encyclopedia would progressively come to the fore, one where distinctions between teaching and research, as well as distinctions between domains and disciplines, would probably be deeply redefined. The limits of the encyclopedia would then become the shifting and moving limits of knowledge itself, and all involved with knowledge, be it teaching, learning, or researching, would envision their work as

> intellectual moves within the abstract, multidimensional space corresponding to a humanity-wide hypertext. (83)

One might think that Guédon was discussing *Wikipedia* in the above passage, but the article was written years before it appeared on the net. Jay David Bolter also presages wikis in his book *Writing Space:* "When there are too many books, [the encyclopedia] offers to control information that has gotten out of hand. When books are not available, [it] summarizes information that the reader cannot get from original sources" (84). Bolter notes that electronic encyclopedias are better than print because they can be as large as necessary and automatically indexed and made searchable by efficient algorithms (87). Wikis seem to offer concrete forms of the shadowy, dynamic writing environments posited by so many early net theorists.

What I hope to have accomplished here is the exploration of several possibilities for the future of scholarship, and I clearly have favored the "wiki paradigm" as a sensible and rewarding alternative to the contemporary paradigm. Of course I have been hypocritical; writing my own dissertation as a linear, single-authored document flowing from a word processor. I have not shied away from "I" nor bleached my prose of my voice, personality, or color. Ironies abound. Yet it seems certain that, if we are indeed living in the "Late Age of Print" posited by Jay David Bolter, then this effort should not seem entirely naïve. Change occurs very slowly in academe, and we still seem more eager to read, discuss, and write printed books and journal articles about new media than the new media itself. We still seem to very much in the pioneering stages of new

scholarship—there is great room for discovery, innovation, and development. It is an exciting time to be a scholar.

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