2

Access

Scholarly and scientific journals have by this point enjoyed a successful print run of some 340 years. It has been that long since the shaky, understated launches, within a few months of each other in 1665, of the *Journal des sçavans* in Paris and the *Philosophical Transactions* in London. Since then, the journal has assumed a myriad of forms and sizes, covering every discipline, subdiscipline, and academic niche imaginable, all neatly summed up, for example, in the succinct simplicity of *Cell*, the narrowly and distinctly cast *Journal of Negative Results: Ecology and Biology*, and the entirely contemporary *Web Semantics: Science, Services and Agents on the World Wide Web*. Over the course of the journal's long publishing history, its pages have been the site of scientific discovery and scholarly breakthrough. Journals have launched stellar careers and ruthlessly exposed frauds; they have hosted hotly contested disputes and provided a refuge for fellow-travelers and like-minded thinkers.

Although the number of journals had steadily grown over the centuries, it was the growth in postsecondary education after World War II, along with the huge influx of government research funding, particularly in the United States, that led to a profusion of new journal titles, with many of the new entries coming from commercial publishers, which were, as a group, just beginning to move into this area of publishing. New titles continued to appear at a rate that exceeded the growth in the number of faculty, which began to slow in the 1980s. What drove the increase in journals was greater government research funding, particularly

in the biomedical fields.[1] Between 1998 and 2003, for example, 783 new journal titles were launched by 149 publishers, with many additional ones appearing from scholarly associations and other groups (Cox and Cox 2003, 5). Although many a journal created out of the vision and hope of scholars and publishers has gone the way of all publishing ventures—namely, out of print—the estimate is that 50,000 scholarly and scientific titles are currently being published worldwide.[2]

Even as the journal's print run has continued into the twenty-first century, it has also struck out on an entirely new publishing course. Over the last dozen years, the typical journal has assumed a parallel digital life, with as many as half of the current titles available online (Tenopir 2004). What began in 1982, with the first electronic edition of the *Harvard Business Review*, which was given limited circulation by Bibliographic Information Services, has quickly grown into a global distribution system for journals in every discipline and field (Thapa, Sahoo, and Srivastava 2001). To have perhaps 20,000 journals or more move to online editions in less than the last dozen years suggests that this is where journal publishing is headed.

It is certainly true that the readability of a journal article on a computer screen does not compare to the ease of reading ink on paper. Still, electronic journals do offer scholarly readers certain advantages. Compared to the print edition of a journal, the online version can be far more readily and exhaustively searched, whether for a concept or term. Readers can quickly move online from citation to work cited, and when they find something that serves their needs, they can, with a click, copy

1. See Roger L. Geiger (2004, 177, 147) on how "the autonomous research mission" of the university grew out of United States federal government agencies that wanted access to the academic expertise that they had had during World War II, as well as on the growth of research support, between 1980 and 2000, by over 100 percent while faculty and student numbers grew by less than 20 percent during the period.

2. Carol Tenopir (2004), a leading scholar on academic publishing, puts the estimate this way: "I can say with confidence that as of the end of 2003, there are just under 50,000 scholarly journals and somewhere between one-third and just over one-half of them are in digital form. One thing I've learned is that these numbers are a moving target and somewhat suspect. Keep checking and keep definitive statements necessarily vague."

the article's bibliographic reference, and perhaps a quote or two, without leaving their keyboard and mouse. They can press Print or Save, if an article they come across is a keeper and worth reading with a pencil in hand.

Online journals have in this relatively short time won over the hearts of my colleagues and our students at the University of British Columbia (UBC) in Vancouver, where I work. Some 40 percent of those recently surveyed by the university's library (2003) ranked online journals ahead of books, print journals, and other resources; there was no such level of agreement on the value of any other scholarly resource. This favoring of the online journal is about to change the very nature of the library. A number of university libraries, including the one at UBC, are eliminating the overlap between print and electronic editions of the same journal in their collections by canceling the print edition. In 2004, UBC cut the print editions of 1,500 journals and plans to reduce its print holdings among a major portion of its 23,000-title serials collection in a similar way. Not long from now, scholars may well be overheard nostalgically recalling to a new generation of graduate students fond stories of the productive discoveries that once came of those serendipitous strolls through the racks of freshly printed journals placed on display in their university library, during the days when you had to be on your feet to browse.

If the journal has readily taken to the Internet, the scholarly book has not, up to this point. Certainly, the initial rumors of the book's imminent death at the hands of this new technology appear to have been greatly exaggerated. Still, many classic works of literature, from Austen to Shakespeare, are available online (although they are still read, I trust, most often in paperback editions).[3] This was not the case with scholarly

3. Project Gutenberg, a public-domain archive that dates back to 1971, has been mounting many of the great books (with expired copyrights). There is the Million Books Project at Carnegie Mellon University, with France's National Library sponsoring Gallica, another open access book archive. The Internet Archive project, led by Brewster Kahle, has a target of a million books pulled from libraries in five countries, with open access to all public-domain titles. The Alexandria Library, with its own historical hopes of reestablishing a universal library, has dedicated itself to providing online access to as much of the world's literature as possible, as well as to its own online archives of Islamic and Arabic literature.

books, at least not until very recently. The digital standing of the scholarly book was radically altered by Google's announcement on December 14, 2004, that it would digitize fifteen million books over the next decade, including the entire seven million volumes of the University of Michigan's library, along with portions of the collections held by Harvard, Stanford, Oxford, and the New York Public Library, with perhaps others to follow. As Suber observed in the wake of this development: "We don't know what it will do to teaching and research, let alone pleasure reading and autodidacticism. But we can be sure that removing access barriers to collections of this magnitude and utility will change basic practices" (2005b). Although only books in the public domain can be read online (but not printed or downloaded), Google Print will allow free searching of all the works, creating an encyclopedic guide to who deals with what.

As promising a development as this is, and as much weight and publicity as it has drawn to the idea of greater access, Google Print is not about faculty members doing what they can to ensure that their current work circulates openly and freely. Google Print does not directly address the crisis of access that has beset the journal literature. It does not provide a means for altering a publishing economy that continues to cut into the scholarly vitality of periodical literature.

Of course, the journal is hardly the whole of the academy's knowledge business. Yet the journal has arrived at a critical point in its own digital transformation, and how its future plays out, in terms of access, rests in the hands of researchers, editors, librarians, scholarly associations, and publishers. Although online scholarly resources are now available in a variety of forms—from online courses to scientific databases—the research article in particular is currently at the center of a struggle over the economics of access that may determine the global presence and impact of the research enterprise.[4] It is a struggle over whether online publishing will further contribute to, or whether it will begin to reverse, what can only be described as the current state of *declining access* to re-

4. For a review of the complete "multidimensional continuum" of scholarly electronic publishing activities that go well beyond the journal, and in relation to tenure and promotion, see Anderson 2004. On the economic benefits of open access to data and public-sector information, see Weiss 2004.

search and scholarship within an otherwise expanding global academic community.

How can access to research be declining, one might well ask, in a knowledge society? This age-of-information paradox follows on the successful transformation of knowledge into a capitalized commodity and economic driver. The university community, at least in some quarters, has caught hold of this wave (see, for example, Gibbons et al. 1994). And as a whole, the academy has been growing increasingly productive in patents, research articles, and doctorates. At the same time, the major journal publishers have been all about merger and acquisition as part of this know-biz phenomenon. The resulting corporate publishing concentration, with its relentless focus on knowledge capitalization and shareholder value, has seen journal prices increase well above inflation rates, and university libraries cannot keep up.

It has been hard enough for libraries to try to keep abreast of the increased quantity of research arising from the billions of dollars now invested in research, as well as the growth of postsecondary education and the professoriate more generally. But libraries are now facing a journal economy in which less is more. That is, the inevitable cancellation of journal subscriptions and reduced circulation resulting from higher prices is still leading to greater publisher profits. The publishing goal is not necessarily increased circulation for the journals. Profits are coming not only from increased prices and publishing efficiencies, but from taking greater advantage of the growing number of titles publishers hold, through such strategies as "bundling" titles in licensing arrangements with libraries that carry no-cancel policies for all of the titles in the bundle. The effect is to increase the publisher's share of subscribing libraries' budgets beyond the number of titles that libraries might have otherwise ordered (leading to cuts in other titles).[5]

5. Elsevier accounted for 50 percent of the University of California online serials budget in 2002, although its titles accounted for only 25 percent of journal use (Suber 2004b). A Credit Suisse First Boston financial report on the scholarly publishing industry points out that Elsevier has a higher profit margin on its lower-quality journals (with fewer submissions), which is one of the reasons for a bundling strategy that does not allow libraries to cancel these lower-quality journals without canceling the higher-quality ones in the same bundle (Suber 2004c).

What this corporate concentration in scholarly publishing looks like can be seen in the holdings of three of the major players: Reed Elsevier with 1,800 journals, Taylor and Francis with over 1,000 titles, and Springer with more than 500 titles. According to one industry report, these three companies now control 60 percent of the materials indexed in the world's leading citation index, the ISI Web of Science ("Merger Mania" 2003). The mergers with smaller publishers, and the resulting acquisition of journal titles, that have made those corporations giants of journal publishing are consistently associated with subscription price increases, amounting to, in the case of one publisher, an average increase of more than 20 percent for each journal moving from a smaller publisher to the larger one.[6]

The growth of the knowledge economy, which might otherwise have been thought to herald the university's ship coming in, has produced a "serials crisis" that threatens the basic access principle otherwise critical to production of research and scholarship. As the Association of American Universities and the Association of Research Libraries solemnly put it in an unprecedented joint statement from the two organizations: "The current system of scholarly publishing has become too costly for the academic community to sustain" (ARL 2000).[7]

Not surprisingly, there are different versions of how this unsustainable impasse in scholarly publishing was reached. I have attended the presentations of representatives from large corporate scholarly publishers, and their PowerPoint slides typically illustrate how a number of corporate academic publishing interests, such as Elsevier (with its august academic publishing pedigree dating back to the sixteenth century), began in the

6. Elsevier, for example, has acquired the academic publishing houses Harcourt, Academic, and Pergamon. See McCabe 1999 and McCabe 2002 on mergers and monopolies among corporate academic publishers: "According to these empirical estimates, each of these mergers was associated with substantial price increases; in the case of the Elsevier deal the price increases appear to be due to increased market power. For example, compared to pre-merger prices, the Elsevier deal resulted in an average price increase of 22% for former Pergamon titles, and an 8% increase for Elsevier titles" (McCabe 1999). Also see Tamber 2000.

7. Similarly, the Wellcome Trust study *Economic Analysis of Scientific Research Publishing* concluded that "[t]he current market structure does not operate in the long-term interests of the research community" (SQW Ltd. 2003, iv).

1950s to respond to Western-government increases in research funding by launching a wide range of new journals. In this way, the corporate publishers initially expanded publishing opportunities for researchers and advanced the circulation of knowledge. The academic community tends to forget, in today's fervor over pricing, the publishers' representatives are quick to point out, that the corporations stepped in to provide the new journals needed to ensure that advances in many fields had a proper venue, as the old-guard scholarly societies were extremely cautious when it came to adding new titles to their well-established lists.

The publishers' story is not without merit. At least one economics study lends this potted history credence, even as the study further fuels the outrage felt in the academic community over the current state of affairs by quantifying how much this corporate incursion into scholarly publishing costs on a journal-by-journal basis. Economist Theodore C. Bergstrom (2001) found that in 1960, economics was served by some thirty journals, almost all of which were nonprofit ventures sponsored by scholarly associations or other academic organizations. By 1980, the number of titles had increased to 120, of which half were published by commercial concerns, and by 2000, that corporate share was two-thirds of the 300 journals then available. The corporate sector was clearly creating or acquiring journals at a faster rate than the nonprofit sector.

Bergstrom also found that the average subscription fees for the commercial journals that were ranked among the top twenty for the field (according to the ISI Web of Science) was $1,660 per year (Bergstrom 2001, 183). Compare this to an average subscription cost of $180 annually for the economic journals published by the nonprofits in the top-twenty list, and you can see the basis for concern. Just as disconcerting is Bergstrom's finding that price has little to do with quality, at least as determined by a particular journal's impact factor.[8] Nonprofit economic journals held the top six positions in the ISI list of most influential economic titles according to their impact factors. The titles owned by

8. A journal's impact factor is an ISI Web of Science measure of its influence based on the average number of times articles in the journal have been cited in ISI-indexed journals over the previous two-year period.

commercial publishers held only five places within the top twenty titles.[9] Through the disproportionately high prices it charges for the journals it produces, not only is the corporate sector taking a much greater share of library budgets, but it exercises a much greater degree of control over the circulation of knowledge than the number of titles it holds would otherwise warrant.

Still, how can a market bear such price differences between commercial and association titles that are so unrelated to quality? How, in this world of consumer savvy, can you sell a product that is more than nine times as expensive as an equally good if not better alternative? And how can you sell it to the same set of relatively wealthy customers year after year, in a pricing spiral, with journal cancellations, resulting from increased prices, leading to further price increases as a smaller number of customers must bear the publishing expenses of the journal?[10] You can do it only if the consumer is blind to price differences and is interested only in acquiring a wide range of top-ranked products. That is, faculty members at leading institutions expect to be able to access all of the

9. Also see Bergstrom and Bergstrom 2004, which reports that "in economics, for example, the average inflation-adjusted price per page charged by commercial publishers has increased by 300 percent since 1985, whereas that of nonprofit economics journals has increased by 'only' 50 percent" (897); Mark McCabe (1999) reports that between 1988 and 1998, biomedical journals published by the leading corporate publishers increased their subscription prices by 224 percent compared to 129 percent for journals from nonprofit publishers.

10. In addition to noting how cancellations caused by price increases lead to further increases for the remaining subscribers, who are asked to generate the same revenue levels to produce the journal, Roger G. Noll (1996) observes an additional cost of these increases: "In addition, the high institutional price causes institutional libraries to be far smaller than would be socially optimal. Of course, for publications in science and engineering, this inefficiency ripples throughout the entire economy, for it means that education, applied research and development, and direct diffusion to the production of goods and services will proceed at a slower rate than otherwise would be the case" (12). McCabe (1999) estimates that a 1 percent increase in the price of a journal results in a 0.3 percent drop in the number of subscriptions to it. The American Physical Society, with fourteen journals, reports "an overall decline of an average of about 3 percent a year (less lately) across all our journals since the 1960s," and the Institute of Physics, with more than forty journals, indicates that "the general attrition slope has not changed" (Swan 2005).

high-impact journals in their field, and the pricing issues that their libraries face are neither here nor there for them. Faculty members run on a different journal economy than the library, one that is determined by the scramble among them for greater research impact: the vanity factor.

To speak of faculty *vanity* may seem terribly unfair to hard-working researchers, toiling away in lab coats and laboratories or in sensible shoes and dusty archives. This is clearly not about the vanity of rock or movie stars. It is something far closer to professional pride, to the pride one cannot help but take in seeing one's work, dare I say, "in print," or in seeing it cited in someone else's work. I would use the term *pride* to capture the economic driver of scholarly publishing for faculty members, except it doesn't do as good a job in capturing the special case of scholarship. Academic publishing is an end in itself. As such, the recognition of one's peers does not simply follow from what one achieves in one's field; this is the very field one plows with the work. That is, recognition of one's peers is the principal measure of one's contribution to a field of inquiry, although there may also be patents or other ways one's work has an impact outside the academy. The particular ego economy of being cited by name, and of being so closely identified with one's published work, even in collaborative endeavors, is not entirely without other kinds of rewards, which follow on this recognition factor. To be widely cited by other researchers and appear in high-impact journals can lead, as I have noted, to improved salaries and working conditions and can also present other incentives for faculty members.

This vanity factor, on first blush, may seem removed from the access question. Differences in costs and access policies among journals mean little, if you are entirely focused on impact factor or some other measure of the journal's reputation. The biggest corporate publishers have carefully cultivated highly reputable journals. To have an article accepted by one of these high-priced journals, or to be asked to sit on its board, or perhaps even to serve as an editor, can easily blind a faculty member to what can seem to be the librarians' issue over the journal's pricing. This vanity factor can be blamed, for example, for frustrating the efforts of the Public Library of Science in organizing, among researchers, an effective boycott of overly expensive journals in 2000. It may account for

why only a small handful of editors have revolted over the escalated pricing of the corporate journals they edit (more on these editors in chapter 3).

Yet the evidence and argument that I go on to present make it clear that the vanity factor is not at all the enemy of open access. Open access is not only about human rights and the greater circulation of knowledge. It is about increasing *research impact*, to use the constant focus of Stevan Harnad's (2003a) compelling campaign for open access. Research impact speaks to the particular vanity or ego economics (or should that be *egonomics*?) of authors writing research articles as part of an otherwise royalty-free publishing system. A work's research impact is not only a measure of what it contributes to the work of others. It speaks, as well, to the recognition and reputation of the author. The vanity at issue amounts to more than a researcher's looking up, in a moment of weakness, the citation scores of colleagues down the hall. In this age of accountability, the need to have one's name in print and on the screen, in the right places and as often as possible, is institutionally reinforced at every turn in academic life.[11] So it is hardly surprising that during discussions of open access, the necessary vanity of academic life—publish well or perish badly—quickly surfaces, as faculty members ask about what this new publishing approach will mean for the current order of things.

Yet at the very point in the discussion when the air is charged with exposed vulnerabilities and vanities, the wise and experienced open access advocate looks up and asks, "Did someone mention journal impact factors and citation counts?" The advocate then quickly sets up a prepared PowerPoint presentation, with slide after slide showing, in study after study and discipline after discipline, that open access is associated with increased citations for authors and journals, when compared to similar work that is not open access. Readers of this book can experience

11. Kamran Abbasi (2004), in a recent *British Medical Journal* editorial, presents an informal international survey of how publications have, in the words of one researcher he cites, "become more important than teaching and the actual research itself," with examples provided of a number of publications and journal ratings determining recognition and reward among "deans, sponsors, government agencies, and employment panels." On the detrimental impact of performance indicators, including such bibliometrics as citation counts, on higher education, see Bruneau and Savage 2002.

the study-after-study effect themselves by accessing the regularly updated Web page "The Effect of Open Access and Downloads ('Hits') on Citation Impact: A Bibliography of Studies," maintained by Steve Hitchcock (2005). Going back to Steven Lawrence's (2001) study, which demonstrated that open access computer science papers garner 4.5 times as many citations as their print equivalents, Hitchcock's annotated bibliography offers access to dozens of studies: past, recent, and ongoing.[12]

When it comes to the vanity of journal publishing, it is as if the open access advocate is declaring, across the poker game of academic life, "I see your necessary professional vanity and raise it with open access by a factor of two, three, or even four times as many citations—depending on the discipline, journal, and other factors." Yes, the advocate insists, bring us your vanities. But do it now, for at some point, as open access spreads, its citation advantage will obviously evaporate. But still, the research impact, in the sense of an increased contribution, will continue.

The citation impact studies on open access reveal interesting nuances of the movement. Kurtz et al. (2004), for example, establish that the citation advantage for open access articles found in astronomy is not attributable to the articles' being freely available online. Those who publish in astronomy need to have access to astronomical data and resources, which, in turn, is associated with being at an institution with sufficient access to the literature. The citation advantage in astronomy at the moment is based on the earlier access afforded by open access e-print archives: first up, first cited. There is also a self-selection bias operating with the archive, which sees better authors archiving more. Kurtz et al.

12. In support of Lawrence's initial finding, for example, Brody et al. (2004) found that with a large sample of pre-2001 physics articles, the ratio of citations for open access articles compared to those that are not is between 2.5 to 1 and 5.8 to 1. Stevan Harnad, in collaboration with others, is also analyzing the relationship between an article's "hits" online and citations using arXiv.org E-Print Archive: "The correlations [between hits and citations] are quite big, and range from .3 to .6 or higher, and seem to vary somewhat with field and subfield" (2003d). In contrast, Kent Anderson et al. (2001) found that with the journal *Pediatrics* in 1997–1999, "an [open access] online article could expect 2.16–4.02 fewer citations in the literature than if it had been printed," although the faculty surveyed felt these open access publications counted as much as other publications for tenure.

do see the open part of open access as playing a greater part in the future. For as astronomy data sets are now being openly shared, a new generation of astronomers at institutions without sufficient library resources to otherwise tap into the astronomy literature will be using the open access arXiv.org E-Print Archive because there is no charge for doing so. So, to speak of rights and vanities in relation to open access is not to set up a tension between doing *good* and doing *well*. They are cojoined in this matter, as both can be enhanced by open access. Taking them together suggests the breadth of the case for open access.

In suggesting that faculty and librarians are driven by different economic factors when it comes to journals, I do not want to overlook how librarians have sought to bring faculty members in on the problems libraries face. During the 1980s and 1990s, if not earlier, librarians sent faculty members lists of current holdings in their fields, from which the faculty members were to identify titles they could not live without (the ones they appear in?) and titles that were not essential to their work (the ones their colleagues appear in?). The lists were consulted as the libraries were forced to make cuts from their serial collections. The numbers were substantial, and at the University of British Columbia, a librarian pointed out to me, 2,000 titles were canceled during that period. The librarians also solicited faculty support in calling during the period for increased budgets to keep up with the corporatization of this knowledge economy.

A comprehensive picture of what even the best research libraries were facing during this time is provided by the Association of Research Libraries (ARL) (2004), which represents the top 120-odd research libraries in North America. Between 1986 and 2003, ARL members managed to increase their budgets for journals by 260 percent. Even with this increase, however, the average library's collection had fewer titles throughout this period than it did in 1986, until finally in 2002 these leading libraries pulled slightly ahead of 1986 levels—by all of 14 percent (ARL 2004).[13] The increased cost of journals has also eroded the libraries'

13. Recent gains in the number of journals are likely a result of major publishers bundling larger numbers of electronic editions to which libraries purchase a license, which reduces library control over subscription lists, with a similar situation taking place among U.K. university libraries (SQW Ltd. 2003, 5–6).

ability to purchase books, with the numbers only returning to 1986 levels in 2003, despite the growing number of books published annually since 1986. What might seem like a game of catch up and keep up has been just as much a game of slow down the falling behind. The ARL initially responded to this situation with a series of information campaigns directed at raising awareness among faculty members, among others, of the need for alternative publishing models, which I return to later in the book.

Yet more recently, individual libraries have also taken direct action. A number of these research libraries have begun to say *no* in a very public way to high-priced journals. Harvard, Cornell, University of California, Duke, MIT, and others canceled Elsevier subscriptions in 2003, some dropping hundreds of titles, with the cancellations often accompanied by pointed letters directed to faculty, publishers and the public documenting and protesting journal pricing policies (Suber 2004b). Sidney Verba, director of the Harvard University Library, which subscribes to more than 100,000 serials, well ahead of any other library in North America (if not the world), explained that the decision to reduce the number of Elsevier titles to which Harvard subscribed was "driven not only by current financial realities, but also—and perhaps more importantly—by the need to reassert control over our collections and to encourage new models for research publication at Harvard" (2003).

Now, if the leading research libraries in North America have been unable to keep pace with the growth (and increased pricing) of scholarly publishing, it should give us pause to ponder what is happening to less fortunate universities, especially in developing countries. As I go on to discuss in more detail, access to books and journals has always been a major struggle for these institutions, but over the last two decades, whatever modest progress they have been able to make in the development of their print collections has come to a virtual standstill. University populations are growing, and the number of qualified and interested researchers is increasing, but the global contribution of this potential research capacity is threatened at its root by empty library shelves and out-of-date literature. It adds up to a picture of declining access to knowledge across a global academic community. The one ray of light and hope in this picture, however, has come by way of this variation in online access known

as open access. The open access movement may have but a toehold when it comes to its current share of journal titles—with close to 1,500 listed, for example, on the *Directory of Open Access Journals* Web site run by Lund University (Lund University Libraries 2004)—but the idea behind it, of using the Internet to increase access to research and scholarship, has had an impact on every aspect of scholarly publishing.

On one level, the journal's large-scale move to digital publication has provided only a modicum of relief from the problems created by high journal prices. Subscription prices for online editions of journals do run a little less than those for the print editions of the same title, if only by 10–25 percent. This reduction is not enough, however, to reverse the declining state of access in the face of price increases that have continued into this century at a steady 8–10 percent a year (van Orsdel and Born 2003). This is why it is indeed fortunate that the Internet has also given rise to an alternative economic model for scholarly publishing.

When it first became possible to post a work on the World Wide Web during the 1990s, a number of journals, as well as newspapers and encyclopedias, briefly experimented with making their contents freely available to readers. That free phase for most of these sources passed quickly enough, as they instituted subscription and pay-per-view access models. However, a small number of researchers persisted in taking advantage of the relative ease of posting materials online to make their work freely available to readers, finding that it made their work far more widely available than traditional subscription-based journals, whether in print or online editions. Some faculty members uploaded their working papers and preprints (which they had had accepted for publication) to their own Web sites, and a few disciplines, such as high-energy physics, established preprint archives that have become hot spots for tracking developments in the field, as more and more faculty members in those areas contribute to them, even as they also send their work to the traditional journals for publication. At the same time, a few journal editors set up free electronic journals, through various combinations of e-mails, listservs, and Web sites.

These various methods of providing free access to the research article are now commonly referred to as *open access*, as in an *open access archive* or an *open access journal*. Exactly what constitutes true and com-

plete "open access" in scholarly publishing has been carefully defined by a number of groups.[14] This book is less concerned with such definitions, although they are clearly helpful in establishing goals and making it clear what this movement is about. It is concerned with the value and viability of *opening* access to this knowledge, and by that I mean *increasing* access and *improving* access to the journal literature, largely through the use of the Internet. It is about ways of making a greater part of this literature accessible to more people. For journals that are not prepared to make their articles freely available to readers immediately on publication, there is now a range of options for increasing access: Journals can enable authors to deposit articles (in preprint and postprint stages) in an e-print archive run by the authors' institutions or to post them on the authors' own Web sites immediately on publication. Journals can make their contents free to read online some six to twelve months after initial publication. Journals can make their contents freely and immediately available to those working at universities in developing countries.

Up to this point, much of the media attention paid to this topic has been focused on those open access science journals that provide free and immediate access to their entire contents. The launch of the open access journal *PloS Biology*, from the Public Library of Science, in 2003 provides an excellent example. The arrival of *PLoS Biology* made a big splash in the press, if not one well understood, judging by such less-than-newsworthy headlines about the launch as "Science Journal to Put Research Online" (2003), from the Associated Press. *PLoS Biology*, which is funded by author fees and foundation support, and whose editors and authors are well-known leaders in the field, has clearly put open access on the map in a way that no other publishing event has up to this point. Yet the open access journal is only part of the story in increasing access to the research literature.

14. The Budapest Open Access Initiative (2002), for example, offers the following: "By 'open access' to this literature, we mean its free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself." Also, see the Bethesda Statement on Open Access Publishing (Brown, Eisen, and Varmus 2003). See also appendix A, table A.1, note a.

One reason to focus on the variety of open access models is to dispel the idea that greater access to the knowledge represented by scholarly publishing is an all-or-nothing proposition. The term *open access* may suggest that, like a door, a journal is open or it is not. The still-emerging realities of opening access to this literature are otherwise. Having recognized the importance of increasing access to knowledge, publishers have found ways of offering greater access to journals without severing the journal's entire revenue stream, or even reducing the number or cost of subscriptions, in some cases. To help clarify the complexities of the emerging scene, I have set out in appendix A what I would cast as ten current flavors of open access, along with their underlying economic model, each of which is currently being employed by authors and journals. I have already referred, for example, to open access archives or institutional repositories, in which authors deposit copies of the papers they have published in subscription-based journals, and journals that continue to sell subscriptions while opening access to the contents of each issue six months after publication. There are also the open access arrangements made by some publishers for developing countries and the open access sponsored by fees that authors, institutions, or countries pay. I go so far as to include in the appendix one of the largest publishing conglomerates, Reed Elsevier, among the contributors to open access, not only because it recently agreed to allow its authors post the final versions of their papers to open access e-print archives, but because its portal ScienceDirect provides free access to bibliographic information and abstracts for its 1,800 journals. This may seem little enough to offer readers until one recalls just how vital and potentially expensive access to good indexing is for scholarly work.

Each flavor of open access demonstrates how alternative knowledge economies have rapidly taken shape in journal publishing over the short life of the Internet. Each of these flavors—from e-print archives to open access indexes—offers a gain in the circulation and exchange of this knowledge over what might have been achieved in print in its late-twentieth-century hyperinflated economic state. Each of them is a further way of realizing what I am calling the access principle, which is concerned with making choices about publishing that improve the circulation of research and scholarship. By the time you are reading this book,

there could well be more or fewer ways of opening access, as the idea grows, consolidates, and takes myriad forms. It is often shaped by the different publishing cultures that have formed around the various disciplines that journals represent. (Is there a preprint culture in a particular field for sharing work prior to publication? Do editors or board members expect to be paid? Is the journal used by a scholarly association to raise money for other purposes?) Although I do at times play favorites among these flavors, what matters is not the particular form that open access takes, but adherence to this principle of increasing and improving access, impact, participation, and circulation.

As for the number of open access archives and journals available at this point, the answer is no less a moving target than the total number of learned journals. There are places, however, to catch sight of the progress in this direction. The Core Metalist of Open Access Eprint Archives, maintained by the Open Citation Project at the University of Southampton, currently provides a guide to hundreds of open access archives with access to papers totaling in the range of hundreds of thousands.[15] As I have already noted, the *Directory of Open Access Journals* maintained by Lund University Libraries (2004) provides another guide. Still, open access journals may, at the point at which I am writing, represent no more than 3–5 percent of the journal market. On the other hand, there are substantial open access journal developments afoot. Brazil, for example, is moving toward open access for its scientific journal publishing activities, virtually as a national policy, through institutional and other grants to its just under 200 scholarly journals (Sabbatini 2003).

Whatever the proportion of the literature involved through journals and e-print archives, open access is demonstrating dramatic and striking gains in the circulation of knowledge. The journal *Education Policy Analysis Archives* provides an excellent example of what a difference open access can make. I mentioned it in the introduction, as the *New Yorker* had picked up one of its articles within days of publication. It was started a decade ago by Gene Glass, a professor of education at

15. The Core Metalist of Open Access Eprint Archives can be accessed at ⟨http://opcit.eprints.org/explorearchives.shtml⟩.

Arizona State University perhaps best known for developing the statistical technique for marshaling the results of statistical studies on a common question, otherwise known as *meta-analysis*. As of 2003, Glass's *Education Policy Analysis Archives* had published 312 articles (including 24 in Spanish and Portuguese), and it was attracting some 2,500 visitors each weekday, which vastly exceeds the typical audience for an academic journal in a field in which a circulation of 600 copies, if largely to libraries, is common (Glass 2003). More than that, the journal's readers came from seventy-five to eighty nations and, according to a survey of readers Glass conducted, included teachers (16 percent), parents (3 percent), and a small number of journalists (1 percent). The journal's two most popular articles (one on home schooling and the other on teacher characteristics and achievement) had had well over 50,000 visitors each, with the readership of many articles still increasing years after publication, again bucking the typical academic trend of initial and then declining interest in work published in journals.

The open access idea is not simply a child of these new publishing technologies. Efforts to improve access to knowledge have a long and venerable history. Open access could be the next step in a tradition that includes the printing press and penny post, public libraries and public schools. It is a tradition bent on increasing the democratic circulation of knowledge, with a lineage that can also be traced back, for example, to the "invisible colleges" of the seventeenth century, which were comprised of informal study clubs that would gather in coffee houses, otherwise known as "penny universities" (Ellis 1956). When the public-library movement took hold during the nineteenth century, local communities and groups of workers came together to establish collections, often without outside government and philanthropic support, such was their determination to access this knowledge and literature (Rose 2003). And of course, many of today's public libraries now provide the surrounding communities with a point of public Internet access to those resources that are freely available online. Further historic parallels to this current access-to-knowledge movement can be found in the university extension movement and mechanics institutes of the nineteenth century, which gave rise to the "open universities" established during the twentieth century. At the heart of these developments was a belief in the right to

knowledge, and at every point people have sought the means to ensure that a greater proportion of the population was able to exercise its right to know what is known.

In presenting the case for open access, this book works from historical precedent and global perspectives, as well as with the development of new technologies and economic models. In all of this, the goal is incremental advances in the circulation of knowledge within the academic community and beyond. I do not assume that the open access movement will somehow lead to universal access to academic knowledge, given the inevitable persistence of a digital divide based on persistent economic inequities. It is already, however, leading to considerable improvements in the access afforded to e-journal literature, well beyond what subscription-based print and electronic journals have been able to achieve within the current knowledge economy. And with the extended circulation of research facilitated by open access come greater opportunities for a larger proportion of the global academic community to participate in and contribute to this body of knowledge.

I realize that greater access to this research and scholarship will not always be welcomed. Some may object that the last thing the world needs at this point is access to more information, let alone more people participating in the production of it. But this stance smacks of the privilege that comes of already having considerable access to research resources. The information-overload argument makes a far less compelling case if one's research library has had its serial holdings decimated by increased prices, currency fluctuations, and budget cuts.

Others may ask what greater access will mean, for example, for the tight and constant hold of Islamic fundamentalism on Iranian universities at this point. Azar Nafisi describes in her book *Reading Lolita in Tehran* (2003), for example, how as an Iranian professor, she found that her every public gesture in the university, let alone her teaching and research, were constrained by what she sees as the politics of a cultural puritanism. The one form of intellectual salvation that she managed to create for herself and a small group of students was through their courageous work with a proscribed body of literature, which took place outside of the restricted sphere of her classroom and after she had resigned from the university.

Nafisi and her students' illicit encounter with Nabokov's novel is not the making of a political revolution. Instead, access to photocopies of *Lolita* fostered a wide-ranging encounter with ideas about literature and morality, for the group, in intersecting discussions of Humbert, Lolita, and their own lives. Nafisi had organized what was at once a secret reading group and a literary theory seminar. The experience raises the question, for me at least, of how the larger academic community, which so believes in the value of such encounters, could do more to support those who gather in such settings. The community could, for example, find ways of making more of its scholarship freely available for others to read, whether for, in this case, the sort of literary underground that Nafisi staged in her Tehran home or during the periodic liberalizations that Iranian universities go through, as they did during her time teaching there (2004, 9).

Now, one might well think: Better they should read photocopies of Nabokov than, say, Colin McGinn's article "The Meaning and Morality of *Lolita*" in the *Philosophical Forum* (1999), and one might be correct to think that. Yet that is not a reason for McGinn and other faculty members to keep from these students what others are making of Nabokov's work when it lies so readily within those faculty members' reach to offer it to them. Nafisi and the students could, of course, read both, and respond in turn. The other side of such access, as I have been stressing, is about the participation it enables in the circulation of knowledge.

Open access is not only about helping faculty and students take in this literature; it is not only about extending the Westernization of that literature, in approach or language. Open access can also lead to the introduction of other scholarly traditions into the research literature, extending that metaphorical conversation that defines one ideal for this body of work. To find new ways of increasing access is to extend an invitation and to acknowledge a right, for scholarship exists only as it is shared and circulated, only as it is open to new and diverging voices.

To stay close by Nafisi's book, the need for greater access has been made all the more pressing with the current rebuilding of Iraq, not only after war but after the universities were bled dry by Saddam Hussein's Baath Party, with faculty reduced, in many instances, to selling their per-

sonal libraries to survive financially (del Castillo 2003a). In the aftermath of the U.S. invasion, the universities were pillaged, with the library at Basra University, which once held two million volumes, reduced to "a mess of twisted metal shelves atop ashes from the books set ablaze by looters," according to a *New York Times* reporter (Santora 2003, A13). In the face of such destruction, it does not seem all that much to explore ways of making more of the journal literature freely available to these struggling faculty and students, who, in the case of Basra University at least, continued to show up each day among the ruins of their campus. Having online access to journals may well be a very small piece in a large puzzle, and it stands well behind the basic restoration of electricity to the campuses. Still, it is the one thing that academics elsewhere can help with, by self-archiving their published work in institutional repositories and by submitting work to open access journals. By the same token, as Iraqi universities gradually get back on their feet, help can be provided to set up online publishing systems that are able to provide the means of furthering Islamic engagement (in Arabic, as well as in English) with the larger body of research. Nothing is going to come easily in Iraq, and after the American invasion, there are ways for the academic community to reach out, without relenting in its analysis, critique, and search for understanding.[16]

Open access models of scholarly publishing hold out some promise for broadening the circulation and exchange of knowledge while more generally expanding research's presence in the world. Open access holds the promise of moving knowledge from the closed cloisters of privileged, well-endowed university campuses to institutions worldwide. Such an approach also opens a new world of learning to those outside the academic realm, to dedicated professionals and interested amateurs, to concerned journalists and policymakers. In this way, an open access approach to scholarly publishing is not simply a side issue, a matter of business plans and delivery systems, in the pursuit of truth. It is about more than the mechanics of moving an idea from point *A* to point *B*, and now perhaps to points *C* and *D* as well. Rather, the potential

16. The United States Agency for International Development has set aside $20–30 million to enable up to six American institutions to help Iraqi universities reach international standards in their curriculum (del Castillo 2003b).

expansion in the circulation of ideas is very much about the quality of the truth pursued in such settings.

I would argue that the global scale of knowledge's circulation is critical to its very claim as *knowledge*. I am drawing here on the work of philosopher of science Helen Longino, who demonstrates in *The Fate of Knowledge* that "the social [dimension of knowledge] is not a corrupting but a validating element in knowledge" (2002, 122). This is why, Longino argues, we need to pay more attention than we currently do to the social dimensions that arise in the day-to-day conduct of scientific work. For example, she draws our attention to how the economic disparities that affect one scientist's efforts or the gender discrimination that affects those of another amount to a form of "cognitive failure" on the part of science as a whole (132).[17] Cognitive failure suggests a slip of the mind, which does not capture, for me, the larger sense of a human research capacity that is being wasted or going unrealized because of what may now be an unnecessarily restricted access to the circulation of knowledge. In that way, I see the social dimensions of knowledge dissemination, within the current economics of reduced circulation, as a moral failure as much as a cognitive failure. Those involved in science could conceivably accomplish far more, and achieve a greater understanding of the world, if the conditions of access were improved. Or to put it another way, using Longino's term, this cognitive failure diminishes the quality of knowledge we possess.

Although Longino pays little enough attention in her book to questions of how research circulates, she adds to the open access argument by stressing that the scientific community "must also take active steps to ensure that the alternative points of view are developed enough to be a source of criticism and new perspectives" (2002, 132). This requires, to her mind, "publicly recognized forums for the criticism of evidence, of methods, and of assumptions and reasoning," which is what the journal literature already represents, although in ways that are currently limited

17. Longino: "The exclusion of women and members of certain racial minorities from scientific education and the scientific professions constitutes not only a social injustice but a cognitive failing. Similarly, the automatic devaluation in Europe and North America of science from elsewhere constitutes a cognitive failing" (2002, 132).

by the current states of access (129). Without unduly tying Longino to my argument for open access, the publishing approach I am proposing here can be said to be aligned with her concerns over access to science. It does address the "limitation of space" argument for publishing complete scientific information, which she raises, as well as "the privatization of information and ideas," which "contribute[s] to the marginalization of critical discourse" (129). Expanding open access to the research literature would also support what she feels needs to be done to "help citizens acquire a tolerance for the provisionality, partiality, and plurality of knowledge" (213). Nowhere is this aspect of knowledge more readily apparent, after all, than in the give and take of journal literature. What better way to build a little epistemological tolerance among the citizenry than to make these objects of partiality and plurality part of its information landscape, if only off toward the horizon and subject, at best, to occasional visits?

As noted earlier in the chapter, during the Cold War, the U.S. government greatly increased the amount of research funding in both basic and applied areas that it made available to the universities. The commercial publishing houses, more so than the scholarly societies, saw the need for new journal titles and increased numbers of issues to absorb new levels of scholarly output. But while the number of titles increased, the actual circulation of this knowledge was gradually curtailed during the final decades of the twentieth century, as increasing subscription prices forced journal cancellations.

Open access is a direct and immediate response to this state of affairs in scholarly publishing. This utopian upstart of an idea developed out of opportunity and experiment. It was initially the work of those who were intent on taking advantage of the new technology offered by the Internet and World Wide Web to improve the vital circulation of knowledge. Open access, even in the very loose and open way I am using the term, takes advantage of automated processes, open source software, and existing technical infrastructure in the university. And its spirit of openness is not strictly an academic notion. Open access journals, e-print archives, and institutional repositories are part of a larger movement to create an open and public space online that would carry forward the continuing life and legacy of print culture.

The spirit of openness extends beyond publishing in the sciences, and Dominique Foray, in *The Economics of Knowledge* (2004), speaks of the emergence of an "open science model" based on establishing an intellectual-property-right-free zone that "has proven to extremely socially efficient" (147). "Open source biology" provides perhaps the best instance to date of this new spirit.[18] Take the Alliance for Cellular Signalling, for example, with 500 scientists worldwide sending in molecular information that Alfred Gilman and his team are using to develop a virtual cell for testing cellular responses to different conditions (Thompson 2002). Then there are the U.S. National Institutes of Health, which began more than two decades ago to provide an open genetic sequence database, GenBank, which scientists can use to compare DNA sequences, as well as contribute their own findings, along with annotations and links to published articles.[19] There is also a movement afoot toward creating "open government information policies" for public-sector information, including scientific, environmental, and statistical sources (Weiss 2004).

Bodies of knowledge that would advance human understanding and benefit humankind seem so clearly a public good that it might well be hard for someone who is not thoroughly a part of the current system of scholarly publishing to understand why the research and scholarship literature is not being made as open as possible. One might argue that the print economy of journal publishing was once as open and far-reaching

18. A third of research geneticists in a recent survey agreed that there had been a decrease in data sharing over the previous five years (as opposed to 14 percent who saw such sharing as having increased). Reduced access was seen to be hurting their ability to evaluate the research, whereas the principal reason given for not openly sharing data was that it was too much work to do so (Campbell et al. 2002).

19. GenBank is a project of the National Center for Biotechnology Information ⟨http://www.ncbi.nlm.nih.gov/Genbank/⟩. Patrick O. Brown, Michael B. Eisen, and Harold E. Varmus referred to the example of GenBank (as well as the European Molecular Biology Laboratory and the DNA Databank of Japan) in launching their open access *PloS Biology*: "Imagine how impoverished biology and medicine would be today if published DNA sequences were treated like virtually every other kind of research publication—with no comprehensive database searches and no ability to freely download, reorganize, and reanalyze sequences" (2003, 1).

as is economically possible. Had journal prices not skyrocketed over the last few decades, it is possible that the idea of creating open access would not have taken the form it has, or at least the idea would not have the force and urgency that it has now assumed. Given that open access has demonstrated how a much wider and more equitable access to the journal literature can be achieved, the issue is no longer about a return to reasonable pricing for journal subscriptions. Rather, at issue is a greater understanding of the potential implications of this approach to the access question, as opening access stands to further the scientific and public quality of research and scholarship.