

The crisis in scholarly publishing: Exploring electronic solutions

Peter Roberts

ABSTRACT

Talk of a crisis in scholarly publishing has become commonplace in recent years. Critics have pointed to the escalating costs of academic journals, pressures on library space, and excessive delays in publication processes as key dimensions of this crisis. With the arrival of the Internet, a solution to some of these difficulties appears to be readily available. This paper supports the move toward electronic publishing, while nonetheless raising some cautions about cyberspace as an alternative realm for academic activity. The importance of maintaining scholarly rigour is reinforced, and the development of sophisticated 'filtering' mechanisms for assessing the quality of electronic information is seen as necessary and important. At the same time, the potential value of new modes of scholarly communication, dialogue and debate (made possible by the Internet) is acknowledged and discussed.

The new information technologies have had a revolutionary impact on many areas of social life in Western countries. The emergence of the Internet - the so-called 'information superhighway' - is one development of special interest to academics. Much of our work as academics deals with texts: with producing, circulating, reading, analysing, and discussing written documents, artistic displays or visual media. The Internet, it has often been claimed, offers opportunities for enhancing and transforming this work. A wide range of academic sites - e.g. discussion groups, job postings, conference listings, information on university courses, etc. - can now be found in the Internet. This paper considers the extent to which and the ways in which the Internet might change just one domain of academic activity: scholarly publishing. The first section sets out some of the reasons for moving from print to the digital text, while the second discusses the phenomenon of specialisation and the nature of academic writing. The final part of the paper defends the importance of refereeing in the publication of scholarly work, but also draws attention to the possibility of new modes of peer review in electronic environments.

Burgeoning literatures, increasing costs and pressures on space

The amount of scholarly material produced by academics has increased at a remarkable rate over the past century. In some fields - e.g. mathematics - the total number of published papers has been growing at an approximately exponential rate for the past 100 years (Odlyzko, 1994). The total pool of academic writing in all areas of study now constitutes millions upon millions of books, articles, reports, and occasional papers. There are approximately 3500 academic libraries in the United States, with total acquisitions amounting to some 1.2 billion U.S. dollars per year. Institutions

affiliated to the Association of Research Libraries (which collectively account for 40% of the \$1.2 billion) spend 58% of their funds on serials (Okerson, 1991).

It is difficult to estimate how many academic journals now exist, as it is not always easy to distinguish between scholarly serials and trade or professional publications of other kinds (Peek and Burstyn, 1991: 101). Nonetheless, it is clear that of the several hundred thousand periodicals included in major databases, many are academic publications and many have been added in the past two decades. One source - *Ulrich's International Periodicals Directory* - estimated that in 1978 there were 60,000 periodicals of all kinds in print. By 1989 the number had increased to 111,950 (Peek and Burstyn, 1991: 101). These figures may be conservative. The International Serials Data System included over 350,000 serials in 1993 (Greenwood, 1993: 30). All accounts suggest that increases in periodical numbers have been especially marked over the past two decades. Thatcher (1995) notes that in the Sciences alone, 30,000 new journals were created in the 1980s.

The costs of academic periodicals have reached seemingly ridiculous levels, with one-year subscriptions (sometimes covering as little as two issues of journal) often running to several hundred dollars. From 1986-1995, unit prices for serials increased over 138%. The average annual subscription cost of a physics journal is now \$1355 U.S., with serials in chemistry not far behind (at \$1239 U.S. per year). Between 1992 and 1996 journals in all major university disciplines showed a significant price increase (an average of 53%). In some domains of study (notably Art and Architecture, and Music) the increase was less marked than in others (e.g. Business and Economics, Military Science, and Technology), but in all cases there was a movement of at least 22.5% in average prices. Price increases of journals published in the United States during this four-year period varied from 32.9% for those indexed in the Arts and Humanities Index, to 49.5% for serials covered by the Social Sciences Index, to 56.2% for periodicals indexed in the Science Citation index (*UCSB Library Newsletter for Faculty*, 1996). Some of the increases can be explained by reference to a form of scientific monopolisation and manipulation: 'Scientists naturally want to publish in the most prestigious journals in their field; those journals are controlled by a small group of publishers; and university and research libraries have to subscribe to those journals no matter what they cost'. As a result, publishers can and do charge 'extraordinarily high prices' for subscriptions (Taubes, 1996a).

As early as 1991, libraries were being forced to make decisions about substantial cuts in serials subscriptions to cover increased costs for printed materials. An Association of Research Libraries report on planned expenditures for 1992 noted that 63% of the libraries who responded to their survey questions indicated their intention of making cancellations to journal subscriptions. The cuts averaged around \$140,000 U.S. per library (Tuttle, 1991). Increases in the number of issues of a journal produced each year have, where such a move has been used a justification for a significant price increase, contributed to the problem. To cite one example, Elsevier, publisher of a number of scientific journals, increased the number of issues of *Fuzzy Sets and Systems* from 18 to 24 per year between 1991 and 1992. The corresponding price increase was a jump from what was already a high annual subscription cost of \$1001.12 U.S. in 1991 to \$1330.69 U.S. in 1992. A similar change occurred with the journal *Advances in Colloid and Interface Science*, which, following an increase in the number of issues from 16 to 24 per year, saw its annual subscription cost rise from \$752.80 U.S. in 1991 to \$1042.57 U.S. in 1992 (Astle, 1991). Librarians were 'greatly concerned' that the price increase for just 11 titles from Elsevier would amount to a 40% jump in subscription costs from 1991 to 1992. One librarian responded, with more than a hint of exasperation, as follows: Though we are getting 'more information for our money', the bottom line is that we do not have the extra \$1800 to spend on these journals when we have just finished cancelling titles worth \$100,000 just to pay our current bills'. 'We are', it was concluded, 'rapidly approaching the time when the straw breaks the camel's back and we must find other ways of disseminating science' (Astle, 1991).

Prices for scholarly books are no less daunting. Paperback editions of academic texts routinely retail for \$40 or more per copy in New Zealand, while hardbacks are often over \$100. Large hardback books can cost as much as \$150 per copy in this country. Much depends on the original arrangement

between the author(s) and the publisher. If an author has promised to use her proposed new book as the (prescribed) textbook for a large Stage One class of, say, 500 students, this is likely to have a positive impact in both securing the contract with the publisher and keeping the sale price down. On the other hand, if a book cannot be used as a set text for a large group of students, finding a publisher is likely to prove a difficult task. Unless the book has a decidedly 'popular' tone and subject matter, it will almost certainly not find support among commercial publishing houses. Some university presses have a policy of backing a certain number of what they regard as reputable scholarly works, even though they know such titles will not sell in sufficient quantities to make them a worthwhile financial prospect. There is, in practice, a form of cross-subsidising within the academic publishing market, with profits from big-selling course readers being used to prop up a small number of 'quality' books with small projected sales figures.

While questions about pricing and sales ultimately need to be addressed within a broader theoretical framework - what might be called the political economy of academic text publishing (for two excellent examples, see Lewis, 1990; and Lorimer, 1993) - one factor relevant to the present discussion is painfully obvious: very few people *read* scholarly books. When compared with other print publications - e.g. glossy magazines, popular fiction and newspapers - academic books attract a pitifully small number of readers. For authors seeking 'fame and fortune' from their writing, figures on average sales of academic books are unlikely to inspire confidence. Thatcher (1995) reports that even for one of the leading publishers of work in literary criticism in the world - Penn State Press - most of the 150 titles published had sales numbering less than a thousand. 65% of the Penn State Press books in this area sold fewer than 500 copies; 91 % sold fewer than 800. Only 3% of the titles generated sales of more than 1000 copies.

The academic book market is largely limited to universities and other tertiary institutions. Unless a book is listed as a prescribed text for a course, students are unlikely to purchase it. Academics, likewise, given declining relative salaries and increasing costs, are buying fewer and fewer personal copies of texts. Thatcher (1995) relays the results of a survey of academics who were themselves published authors in the field of literary criticism, noting that of those who responded 63% said they spent \$400 or less per year on books in their domain of study. In many cases, just a single copy- if that- of a new academic book will be purchased for the entire staff and student population of an institution: this will, in most circumstances, be housed in the university library. Sometimes, embarrassingly, books purchased for libraries are *never* (or hardly ever) borrowed, further reinforcing the notion that the 'market' for academic texts is very small indeed. Given the possibility of such low borrower interest for some titles, it is hardly surprising that under tight budgetary circumstances many published academic books find homes in only a relatively small number of libraries.

With many universities in Australia, Britain, Canada, and New Zealand (among other places) experiencing severe financial constraints, the incentives to cut costs in purchasing and storing print publications are high. There is, in many instances, simply not enough space available to handle the burgeoning literatures in most fields of study. When space constraints are combined with minimal readerships for many scholarly works, it becomes increasingly difficult to justify calls for more library resources. For, as libraries expand, a whole range of associated costs must be taken into account. Those making decisions about how to spend their university budgets must consider not just the cost of every new book (or serial), but also the expense of creating new buildings (or adding to existing storage spaces) and the need for more library staff as collections grow. As staff numbers in libraries increase, a host of spillover costs (e.g. in administering salaries, organising internal reporting and management systems, auditing expenditure and income, etc.) follow.

The rapid growth in published papers in many areas of academic inquiry can be partly explained by enormous increases in the total number of academics this century. Higher education has experienced repeated crises of underfunding over the years, and these continue to the present day. Yet, even though staffing levels have not kept pace with the surge in student enrolments,



additional researchers and publishers have been steadily added to most areas of study decade after decade (especially in the second half of the twentieth century). In mathematics, exponential growth in published papers has been paralleled by exponential growth in the number of mathematicians since the early 1930s (see Odlyzko, 1994: 7-8). This may not hold for all disciplines, but it would certainly be fair to say that few fields of study have experienced a *decline* in the total number of scholars over recent decades. There are simply more people - not only those employed in tenured academic positions, but also tutors, those on short-term contract positions, research fellows, librarians, graduate students, and so on - engaged in academic writing today than at any other moment in human history.

Specialisation

The amount of scholarly material not available presents serious potential problems from an educational and epistemological point of view. The development of both breadth and depth of understanding is becoming increasingly difficult as academic study - and the publishing activities associated with it - has evolved into a more and more specialised process. Attaining a well-rounded view of the world, or even a working knowledge of several fields of study, can seem like an impossibility in contemporary scholarly environments. Scholars are, in effect, *forced* to become successively more selective in what they read and write as the total volume of published academic writing grows. New areas of academic inquiry have blossomed like mushrooms in universities and other tertiary educational institutions over the past two decades. This can, to a certain extent, be explained by the desire among some academics to build empires and the need among many others to obtain or retain a job. But the proliferation of new courses (and the supply of published research materials for them) can also be understood as a logical outcome of the seemingly unending process of specialisation. New paths for academic investigation are constantly being found as fresh discoveries are made, alternative questions asked, and different problems posed.

Take the case of doctoral theses. Given the requirement that doctorates be original, scholars have little choice but to narrow the focus of their studies, such that topics addressed in these these days exemplify a level of specificity barely imaginable at the turn of the century. No one, it seems, writes books or theses which boldly address all, or even several, of the 'big' questions so fundamental to human inquiry over the centuries. This is an exaggeration of course, but there is some truth to the notion that holistic thinking is discouraged - by default, perhaps, rather than design - in the contemporary academic world. Works such as Plato's *Republic* and Comenius's *Great Didactic* are truly products of an earlier era in human history. This is not just a statement about the shaping of ideas in different contexts, but also an assessment of what is *permissible* in a given epoch. There are some notable exceptions to the trend toward ever increasing specialisation (one example is Allan Bloom's *The Closing of the American Mind*), but, in the main, the logic of the process is all pervasive. Attaining sufficient depth in analysis - as judged by either a panel of thesis examiners or a group of one's academic peers - positively demands a narrowing of research focus. One simply will not be passed, or published, if one attempts to address 'the order of the whole of nature and man's place in it' (Bloom, 1988: 372).

It is also important, of course, to address the politics of university life in attempting to get to the bottom of this phenomenon. Academics publish not just because they believe they have something of value to say about a particular subject, but because they are *required* to by university authorities (cf. Kling and Covi, 1995). Most appointees to academic positions are compelled, as a condition of their job, to undertake research and to disseminate their findings through accepted forms of scholarly publication. For scholars seeking their first academic appointment, publication in scholarly journals and/or books is essential in competing for university positions in most areas of study. The quality and number of one's publications is - theoretically at least - an important factor in promotions decisions, and the granting of financial aid for research expenses is almost always dependent upon an established record of publishing activity. It is easy to over-estimate the

importance of publishing, especially in the current environment, where a state of financial crisis in institutions of higher education is the norm rather than the exception. Placements on salary scales, promotions, and appointments to senior positions are arguably determined by luck, timing, politics (both within and outside institutions), and 'market demand' as much anything else. Nonetheless, both university rhetoric and anecdotal stories of the past - as where those who were active in publishing really could expect to flourish - still exert an influence over professional decisions and the setting of individual academic priorities.

It is tempting, then, to argue that reducing the *pressure* to publish by placing greater emphasis on teaching (and administration, organisational abilities, or whatever) in appointment and promotion decisions might assist in addressing the current crisis in scholarly publishing. The often quoted maxim that scholars should 'publish or perish' certainly *used* to be well known in university circles, and, as I have intimated above, still exerts some regulatory influence over the career decisions of young academics. While recent promotions results (e.g. the 1996 round at the University of Auckland) suggest that the old 'rules' no longer consistently apply, the production of written materials for publication continues apace. Academics seem to want to keep writing, despite decreasing recognition of publishing achievements.

Any moves to reduce covert or overt pressures to publish would have to be widely promoted and consistently adhered to - for a considerable period of time - before academics are likely to become convinced of the merits of diminished publishing activity. Indeed, it is difficult to see how a policy of this kind might work in practice, for encouraging academics to reduce their commitments to research, writing and publication goes against the grain of much that a university typically stands for - or *attempts* to stand for - in the contemporary world. In staking out their territory in a tertiary environment saturated with new institutions' programmes, diplomas, certificates and degrees, universities frequently refer to the integration of teaching and research as one of their key distinguishing features.

There is, perhaps, something about the idea of curtailing intellectual energies - as far as these are expressed and represented by research and publication - which stands in tension with the very essence of university life. Lederberg (1996: 1), in discussing the scientific publishing_ and in particular 'the original reporting of scientific data and theory, formulation and assertion of claims with respect to priority and the like' - maintains that the scholars who contribute to this 'primary literature' are, 'by and large ... totally uninterested in royalties, which have indeed generally not been available to them'. The same might be said of those who work within the humanities and the social sciences. The old picture of a devoted scholar working deep into the night still conveys an accurate picture of academic life, even if - by necessity rather than choice in most cases - many of the extra hours now have to be devoted to growing teaching and administrative duties. A university is meant to be the 'critic and conscience of society' (to use the terms set out in New Zealand legislation). Intellectual creativity has been a vital ingredient for historical change over the centuries. Suppressing the drive for knowledge and the urge to write runs counter to scholarly goals universities have always set for themselves. In short, it is hard to see how a policy of 'slowing down' or discouraging research and publishing activities might be justified or implemented.

For the time being, at least, I think we must accept that the total volume of written material is unlikely to decrease. I have been speaking mainly of research, writing and publishing in academic circles. If we were to widen the net to include the production of all written texts in homes, work environments, government departments, and the full range of educational institutions, the encoding of information, ideas and thoughts in written form emerges as a major growth industry in contemporary Western societies. Whether it is personal letters, poems, book manuscripts, school projects, government papers, business reports, newspaper and magazine articles, or appraisal statements, writing is *vital* to (post)modern life. I want to suggest, then, that we should shift our focus somewhat and aim not to reduce the amount of available written material but to reconsider the *form* (medium) through which we encounter written texts.



Electronic publishing

The new information technologies will, I believe, have a significant impact on scholarly publishing over the next few decades. Already, there has been much debate over the future role of libraries and librarians (compare Arnold, 1995a, 1995b; Caplan, 1994; Cohen, 1993; Hawkins, 1994; Helstein, 1994; Kahin, 1995; Quinn, 1994; Rapple, 1997; Rooks, 1993), and the vexed question of how copyright and intellectual property issues might be addressed in relation to the Internet has, as one commentator put it, become the 'brain acpe' of the decade (P.E. Peters, 1995; see also, Brent, 1991; Dilworth, 1991; Saltrick, 1995; Strong, 1994). A number of articles on the economics of electronic publishing have emerged (e.g. Day, 1994, 1995; Varian, 1996). Some authors have asked 'Why is the Internet so cheap?' (M.M. Roberts, 1994), while others have cautioned that electronic journals are 'neither free nor easy' (Rowland, 1994). The relationship between commercial publishing and open-access Internet publishing has been investigated at length (for a thorough discussion, see Sosteric, 1996a). This is, it seems, a pivotal moment in the history of scholarly publishing: a time of great upheaval and turmoil, characterised by multiple emotions - fear, suspicion, excitement, hope, cautious optimism - as academics across the globe reflect upon the unfolding electronic reality.

It is worth noting, however, that there is much that will *not* change as we move into digital publishing environments. Scholars will still undertake research, write up their findings, and disseminate them. The academic periodical will remain an important repository of academic knowledge, and many journals will continue to use systems of peer review to ensure written work is of high quality. Refereeing processes will, for some journals at least, be substantially similar to those traditionally employed in print periodicals. Trends toward increasing specialisation are unlikely to be halted. This prediction finds support from Readings (1994:10-11), who argues that specialisation is a 'response to the swamping of the academic community with information, a process that electronic publication will intensify exponentially'. If these trends and conventions in traditional scholarly publishing and academic life will remain undisturbed, what might change? Answering this question requires an examination of some key differences between printed documents and digital texts.

Printed documents can, if they are treated with care, last for centuries. Once a document has been published in print form it becomes a 'fixed' reference point for future study. The movement from speech to print signals the loss of a certain fluidity in the encoding of ideas. Once words become encased in the covers of a print journal or book, they do not 'move about' in the same way as ideas tossed backwards and forwards in a spoken conversation (cf. Hanard, 1991). This has its disadvantages. Mistakes in proof-reading and type-setting - some of which can be embarrassing or misleading, and for which the author may not be responsible - cannot be corrected. The printed text is the final version of a paper in a print journal. It must 'speak' for the author in place of all previous drafts, and, unless it is reprinted elsewhere, must carry its faults for all time. Hence, the relative permanence of print seriously limits possibilities for updating academic work on a regular basis.

In an electronic environment a scholarly paper can be readily - and repeatedly - revised in the light of criticisms, comments, later findings, and ongoing reflection. Several versions of an important article might exist. A paper can be republished with far greater ease in digital form than through the medium of print. Reprinting is now an exceedingly expensive exercise, as authors sometimes discover when they seek additional copies of their articles from journal publishers. Some significant questions and problems would, of course, have to be addressed if the idea of allowing (or encouraging) authors to produce multiple versions of papers were to be contemplated. For example, editors and/or authors would have to decide whether only the latest version, or *all* versions, of an electronically published paper should be available to readers. Nonetheless, it is now possible to experiment with a range of revision systems and citation conventions which would hitherto have been impossible or impractical in the print world.

While an innovation of this kind flies in the face of conventional publishing processes, there are surely compelling scholarly reasons for allowing authors to successively update and improve their

work. Most subject areas are undergoing constant change, and academics who endeavour to stay abreast of these changes are often challenged by them. The ability to respond in a positive manner - which may mean modifying or reworking one's original ideas - is often regarded as an important virtue in the academic community. Yet, in the past, there have been few avenues for fostering up-to-the-minute scholarly discussion. Academic conferences provide a forum for testing one's ideas and discovering the latest research results, but there are obvious financial impediments to organising and attending conferences on a regular basis. Scholarly periodicals *should* provide a good alternative forum for productive academic exchange. Print journals, though, are simply unable to 'keep up' with the constant movement of ideas. They are, to put it in colloquial terms, 'stuck in first gear' (Taubes, 1996b). Indeed, one theorist (Guedon, 1994) has suggested that print periodicals diffuse research results at such a slow pace they now serve more of an archival than communicational function. A typical cycle of intellectual production, from the birth of an idea to the publication of a finished print article in a refereed scholarly journal, is likely to take around 2 years (cf. Hamad, 1995; Long, 1996). With such long delays between writing and publication in conventional periodicals, much of the (potential) dynamism in academic thought and debate is lost.

With the passing of such a long period of time, the author's ideas may have changed in significant ways, and new trends in her field of study may have developed. If academic colleagues show a willingness to engage and debate the content of a published paper, they may, in effect, be debating the ideas of a 'different' author than the one named at the top of the article. Authors can sometimes find themselves being called upon to defend positions they no longer subscribe to (at least not entirely) themselves. In short, the whole process of circulating ideas in this fashion becomes somewhat artificial, and opportunities for productive scholarly dialogue can disappear.

Electronic communication affords new possibilities for enhancing the immediacy of scholarly discourse. Improving the speed of academic communication does not, however, guarantee that the quality of published work will be maintained. Indeed, some commentators (e.g. Burbules and Bruce, 1995) believe the permanence of print encourages authors to take special care in researching, writing and checking papers for publication. There is a sense, it might be claimed, that if one is committing one's ideas to print, 'getting it right' becomes crucial. For once a paper has been published in print form there is (almost always) no way of 'going back' to alter what one has said. The greater speed at which academic ideas can be circulated in an electronic environment might conceivably lead to a lowering of scholarly standards as authors 'drop their guard' a little, aware that should they miss the mark a new version of a paper can be published with relative ease.

I think these fears are misplaced. There is nothing, in my view, about publication in electronic form that *necessitates* a more 'rushed' presentation of one's ideas. The amount of time spent on the research for, and construction and proof-reading of, an academic article need not vary whether one is intending to submit the paper to a print periodical or an electronic journal. Publication in the latter form simply reduces delays associated with editorial correspondence, the soliciting and receiving of referees' comments, proof-checking, and (especially) time spent waiting for the scheduled print run of the issue of the journal in which the paper is to appear. The time spent in getting the manuscript ready for submission, and in preparing the final version following peer review, is still a matter over which authors have the ultimate control.

It is true, however, that many who 'publish' on the Internet have *not* negotiated traditional hurdles before making their work available for others to read. This is where rigorous systems of peer review - and especially *international* peer review - become important. The continued use of refereeing will be vital if scholars are to accept electronic journals as 'legitimate' sources for scholarly information. Indeed, if current trends continue, the need for robust and reliable systems of 'quality control' will become all the more important in an electronic world. The Internet has, on occasion, been described as a sort of 'global graffiti board': an open slate for the pasting of all thoughts and ideas, no matter how poorly formulated they may be. The amount of 'rubbish' - of what might at best be called 'trivia' - on the information superhighway is indeed staggering. Sifting through the



mountains of information for good quality work can be a quite overwhelming task. As Fallows (1996: 119) puts it: 'The easier it becomes to store any kind of data on a computer or to dump material onto the Internet, the harder it can be to find what you are looking for'. Some sophisticated and amazingly fast search engines (e.g. Alta Vista, HotBot, WebCrawler) have been developed, but unless one is particularly skilled in setting careful parameters for searches, these can make the problem worse: (almost) *everything* containing the specified keyword(s) is uncovered. Subject search engines are emerging as a viable means for sorting through Internet materials, and, increasingly, professional societies and academic groups are themselves beginning to order and classify journals, books, and sites for specialist collections. In addition, of course, many of the journals now coming on-line continue to employ refereeing processes of exactly the same kind as those used with print periodicals (with initial editorial 'cuts', papers being sent on to readers for critical comment, revisions being required in most cases, etc.)

What should be avoided, I think, is a situation where publication depends not on the quality of written work but rather the limits of a particular technology. Print-based publication systems are prone to precisely this kind of problem. Good work may fall by the wayside not because some editors want to reject much of what they receive, but simply because the costs associated with print journals place severe limits on how much copy can be produced. Editors are themselves tightly constrained by page limits generated by production costs, and authors are often forced to cut large portions of their papers in order to fit within space requirements. In short, both authors and editors are compelled to make compromises they might otherwise not make, given the nature of print publishing.

In the (largely) borderless, (theoretically) infinite space of the Internet, concerns over the amount of copy become less significant. While there are, of course, still costs associated with producing documents in browser-ready (usually HTML) form, these are substantially lower than those involved in print publishing. Editors of refereed electronic journals have a better chance than their print-based counterparts of being able to accept *all* written material judged worthy of publication. Where authors feel they have been unfairly treated by editors or referees, there is greater scope for publishing work elsewhere. In some new or very specialised fields, electronic publication provides an answer to the problem of 'lost ideas': work conducted in a scholarly manner but often, for one reason or another, not published. Sanders (1996) makes a case for publishing, via the Internet, many theses, conference papers, curriculum materials, and research reports in his field - technology education - as a matter of some urgency. Proactive measures should, he says, be taken '*right now*' to archive important ideas in technology education through the new medium, given the substantial quantity of good quality material that 'falls through the cracks' each year.

As a 'last resort', authors might 'self-publish' their paper through a personal or departmental Internet home page. While this form of publication obviously does not meet the requirements for scholarly rigour discussed above, it does allow written work which might never have seen the light of day to become available to the international academic community, without cluttering library shelves or taking up space which might otherwise have been used for refereed material. Some scholars might *choose* to self-publish their papers, given their reservations about the forms of revision often requested by referees. They may be confident their work might eventually be accepted for publication in a refereed journal, but have concerns about what may be lost in the reviewing process. Agger (1990) notes:

Although reviewing can be extremely useful, alerting the solitary writer or writing team to both stylistic and substantive issues unforeseen by them, too frequently reviewing and editing determine all authorial choices; the revision process becomes a *subversion of original authorial craft*, capriciously undermining literary originality. We academic writers put up with one-sided power relations between ourselves and editors and reviewers simply because we view this as inevitable, something to be born tiredly in the hurly-burly of the competitive academic marketplace. Most of us are too beaten down to challenge the often arbitrary, sometimes downright pernicious and always disciplining directives from reviewers and editors (pp.142-143).

The competitive nature of contemporary academic life provides only part of the explanation for state of affairs. It can also be argued that the constraints of print-and-post systems of scholarly review have shaped and limited our view of what academic refereeing might entail. If the prime purpose of peer review is to ensure, as far as this is possible, the elimination of errors and the maintenance of the highest possible standards of scholarly rigour, there are several ways of working toward this goal. Editors have always acted as mediators between referees and authors, and referees have usually been shielded from authors by 'double blind' refereeing practices. Neither of these traditions seem to me to be beyond criticism, and might begin to be broken down in an electronic publishing environment (cf. J. Peters, n.d.).

It is now possible to imagine journals where, an almost unlimited number of 'referees' might comment on particular papers. Authors might write a paper, quickly distribute it (electronically) for critical comment among a few colleagues of their choosing, publish it via the Internet, and then await replies from others in their field. These responses might then form the basis for extended debate, such that both the author and any or all of the 'referees' who have offered their comments successively refine, defend, elaborate, or modify their scholarly views. Authors, as I noted earlier, can publish improved versions of their papers with relative ease in an electronic environment; similarly, 'referees' can reconsider their initial judgements in the light of comments from authors and their peers. This sort of system opens up the whole reviewing process to more closely resemble a form of 'live' scholarly debate, formerly only possible in speech-based forums like academic conferences. Authors *and* referees (of which there might be merely a handful, or several hundred) would still generate scholarly work through the disciplined medium of writing, but would also have a better opportunity to share and debate ideas *as they arise*.

Systems exhibiting some of the characteristics of scholarly debate suggested above have already been instituted in a number of electronic journals. Steven Harnad's *Psychology* provides a good example. This electronic journal publishes articles in the biobehavioural and cognitive sciences, and draws on the expertise of scholars in a variety of supporting disciplines (psychology, neuroscience, linguistics, philosophy, etc.). Major, full-length 'target' articles are published subject to traditional (very rigorous) formal refereeing processes. Additionally, however, the journal publishes refereed peer commentaries on the target articles, authors' responses to the commentaries, and 500-word accounts (also refereed, but very quickly given the advantages of the electronic format) of current ideas and findings for debate among interested international readers (see Hamad, 1992, 1995). Stodolsky (1993, 1994a, 1994b), another leader in this area, has argued for a form of scholarly self-regulation via 'consensus journals' - electronic periodicals combining some of the features of publication by invitation as well as elements of traditional peer review processes - and 'telematic journals' based on a computer conferencing systems. Sosteric (1996b) has investigated possibilities for 'interactive peer review' in the *Electronic Journal of Sociology*, and a range of 'open' refereeing initiatives (where the usual cloak of anonymity is removed) have been trialed in the Internet. The shift toward less secretive approaches to refereeing will, as John Peters (n.d.) notes, require some adjustment in our thinking about the nature of peer review. A half-way measure currently being implemented by some editors involves the production of 'parallel' publications: the 'main' journal and a 'companion' periodical involving less formal processes of scholarly exchange (see Burnett, 1993). Similarly, some authors append responses to earlier drafts of their papers when they publish later versions (see, for example, Wilson, 1995). Finally, experimentation in the frequency of publication and the 'bundling' of papers is currently underway in the Internet (Hitchcock, Carr and Hall, 1996). As electronic journals proliferate over the next decade) evaluative work on the merits of different systems of peer review, electronic discussion, and critical scholarly commentary will clearly become increasingly important.

Concluding comments

This article has identified a number of problems with print-based scholarly publishing. The shift to electronic publishing will address *some* of these difficulties. Electronic forms of communication will reduce delays and costs in the publication process. Libraries will no longer have to confront the question of how growing mountains of scholarly books and articles might be stored. But some aspects of scholarly publishing are unlikely to change. Specialisation, worrying though it may be for many of us who cling to the ideal of the 'well-rounded' scholar, will almost certainly not be halted. The amount of written material produced by academics (and others) will, if anything, *increase* over the next few decades. The need for effective 'filtering' or sorting mechanisms will correspondingly become more urgent. For this reason, among others, refereeing of some kind is likely to remain a vital part of scholarly publishing. As electronic journals evolve, however, new systems of peer review will be trialed, tested and analysed. Indeed, there is probably 'at least a generation's worth of work to do ... in reinventing our libraries, preserving physical ephemera, creating new research archives, and revamping our modes of scholarly communication' (Unsworth, 1994: 6).

The Internet does not, to my way of thinking, represent a threat to traditional canons of scholarly rigour and academic practice. Nor does it provide a panacea for addressing all elements of the alleged (multifaceted) crisis in scholarly publishing. The journey into cyberspace is fraught with dangers. Of special importance for scholars, there is a risk that the old ideal of breadth and depth in knowledge and understanding will be replaced by qualities such as 'skill in browsing' (see further, Roberts, 1996, 1997). The phenomenon of 'information overload' is gaining renewed significance as the total volume of available material on the Internet continues to grow at a startling rate. Many minor problems - finding a standardised system through which page numbers for electronic documents can be cited, for example - have yet to find satisfactory solutions. While the World Wide Web may allow manuscripts (and supporting correspondence) to be forwarded and circulated with a minimum of fuss and considerable savings in time, academics are still dependent upon the goodwill of editors and/or reviewers in seeking rapid responses to their ideas. Political and institutional pressures, among others, will continue to bear heavily on decisions about what, how, why, where, and when to publish. Electronic journals provide a window of opportunity for rethinking peer review and the nature of scholarly communication, but they do not escape some of the potential human failings many of us have experienced from time to time in the print world.

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