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An Intellectual Aquifer: The Bulletin Board Goes Global

However well endowed, no library can pretend to collect all the world's output if journal subscriptions and books must be paid for. Yet, once scholarly publication has shifted to open, every laptop will access the new Alexandria in the cloud. Digitality and open access amalgamate the dissemination, collection, and storage that used to be divided among publishers, bookstores, and libraries.

With the subscription model of journal financing, problems arise if the quantity or price of periodicals increases out of line with library budgets. If both do, as has been true over the past half-century, then the scissors open widely. Something similar holds for books. Even the largest libraries serve national catchment areas. Besides being deposit institutions, preserving copies that domestic publishers must deliver, they are national collections—the Bibliothèque Nationale, the British Library, the Library of Congress among the largest, with equivalents in every country.

National libraries naturally have books from elsewhere, but they focus domestically. Few have aimed beyond their nation to collect globally or even regionally. Among only a few peers, the biggest US university libraries have explicitly collected transnationally. Of books in the major East Coast libraries (the Library of Congress,

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Widener, and the NYPL are among the largest), more than 60% were published outside the US and Canada, and almost half are in languages other than English.[1] In the holdings of the US Association of Research Libraries, 48% are in English.[2] Such global collectors are the exception. A similar proportion of foreign books is found nowhere else. Of the British Library's 16 million volumes, only 16% to 27% are not in English.[3] That also holds for the 30 million distinct titles in the 32 libraries of the UK Research Libraries consortium, where 70% are in English.[4] Of the Bibliothèque Nationale's 13.5 million books, 25% are not in French.[5]

There are more books from Sweden in Harvard's Widener library than in the Royal Library of Denmark in Copenhagen, 30 miles from Sweden. Doubtless, the favor is returned at Stockholm's national library—surprisingly, a much smaller institution for a country twice as big. There are twice as many German books in Widener (1.6 million) than in the Bibliothèque Nationale in Paris (833,000).[6] To state the obvious: even massive research libraries cannot hope for every book or periodical. Most have not even bothered to try.

As scholarly output increased in volume and price, the inherited system felt the strain. Library budgets barely kept pace with the growth of domestic books and periodicals. Casting their nets wider became less realistic. A global library of Alexandria was unfeasible in the analog, paper-based, reader-pays model.

Imagine a global deposit library in the analog era, a single place where all nations send a copy of every book and journal published. It would be massive. If the US represents one-seventh of global publishing output annually (300,000 out of 2.1 million volumes) and if the Library of Congress's collections are 40% domestic works, then an institution holding the world's output would be at least thrice its size.[7] That implies an acquisitions budget for past content of $21 billion (253 million books in existence minus the 39 million already owned at $100/book) and operational costs of $2.25 billion annually, or triple the Library of Congress's current budget

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of almost three-quarters of a billion.[8] And let's not forget a reading room able to seat at least 5,000 readers.[9]

Even if we assume that this is a global deposit library with the world's book production delivered gratis into its hands every year, that knocks only about $220 million (2.2 million times $100) off its running costs, leaving $2 billion. That is still far above UNESCO's annual budget ($1.3 billion for 2020 and 2021 together), the closest we have come to global cultural cooperation.[10] Even if spread over the world's nations, it remains a hefty sum. And that is for a single library to which scholars and researchers must pilgrimage.

Duplicating such institutions in each country is even less realistic. It is a stiff cost to saddle publishers with delivering their books to each of some 200 national libraries. Historically, presses have bristled at having to provide just one or two copies to their own national institutions.[11] If not the publishers, then libraries' acquisitions budgets must pay—a weightier burden the smaller the nation and the more foreign content it must buy. And, of course, none of this makes the system open access, even for the scholarly literature. With reader-pays publishing, a global library is impossible. Only by flipping to author-pays or other means of making content gratis for the reader can we achieve such ambitions.

We live in a happy world where ever more researchers produce ever more knowledge. In developed countries, women and other formerly excluded groups now participate in research. Developing nations are joining the club, too. Scientific output has been welling up from China and other nations not previously in the international research community. In absolute numbers, China now publishes more scientific and technical articles than the US.[12] How do libraries deal with such waves of new content? In subscription or other reader-pays systems, there is no good answer. Acquisitions budgets are drained, and some form of rationing follows.

The dirty little secret of the reader-pays system was that it spread costs beyond the research-intensive nations and institutions. Books

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and periodicals bought by countries that produced little content and institutions that consumed more than they issued subsidized publication. In the Association for Computing Machinery's journals (global revenue $20 million annually), 80% of articles are provided by the top thousand subscribing institutions, but they supply only 32% of subscription revenue. Conversely, the long tail of 1,700 institutions publishes only one-fifth of content but pays 68% of revenue.[13]

As content production globalizes, such subsidies cancel each other out. China and India used to just buy Western output. Now they also produce their own. They cannot afford to buy it all, nor can the West. A reader-pays model is inherently unworkable when production grows and its sources are distributed more evenly worldwide. Libraries can collect globally only by reversing the funding flow, making authors pay. Paradoxically, recipient libraries do not even collect, catalog, store, or otherwise deal with works in this model. They reside on the publishers' servers, freely available to anyone once paid for. Put another way, the global library is possible insofar as conventional libraries vanish.

A similar logic holds for gold access. Gold relies on reciprocity of production and payment. If authors pay to have their work disseminated, readers everywhere benefit. But if authorship is geographically, nationally, or institutionally skewed, then some players pay so that others can read. Gold works only within a closed loop of mutuality. A nation that flips its publishing model, using monies earlier earmarked for subscriptions to pay publication charges, makes its research free for the world. Only if others do likewise does that function. Otherwise, it has to pay twice—to make its own work available and to buy foreign non-open work. Unreciprocity was the risk feared by the Finch Report in the UK and the top British research universities united in the Russell Group.[14] And by the Europeans who sought to restrict their gold material, making it readable only in regions that were doing the same.[15]

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A similar logic holds for the PLOS's Community Action Publishing model, inaugurated in 2021. That seeks to relieve burdens on research-intensive institutions while keeping their read-intensive peers within the financing loop. High-read institutions' annual fees are lower, reflecting their lesser publication rates. Thus, they are encouraged not to exit altogether and free-ride on others' efforts. Those with no publishing history at all can participate at the lowest tier, which is only 1% or 2% of that paid by the most prolific.[16] Conversely, the same logic motivates Latin America's rejection of gold access. Latin nations have long issued most scientific work in government-sponsored open journals, that include many articles by foreign authors, who are unlikely to be taxpayers.[17] Having already made public goods of its scholarship, Latin America resented Plan S and similar developed-world attempts to exclude it by geolimiting access to gold journals.[18]

Gold works only if applied globally. If gold nations must pay both to publish their own work and buy other countries' subscription content, then the deal is off. As content production globalizes, however, the prospects of gold access's reciprocity being fulfilled increase. The payoff is handsome for everyone. At the cost of openly publishing its own content, each nation receives the rest of the world's in return. Small and poor countries must carry only their own burden to receive the entirety of the world's output.

The only remaining issue is ensuring that developing nations' scholars can afford publishing charges. They are in much the same predicament as the industrialized world's humanities and social science researchers. And the affordability problem is exacerbated by heftier book publishing charges for fields using that medium. Discounts and subsidies for publishing fees are partial solutions. Some journals offer them for humanities scholars.[19] The so-called predatory journals have flourished by providing gold access at a discount. Insofar as the gold route remains unaffordable for many scholars, other fixes are needed.

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Having started to solve the problem for themselves via gold access, the sciences of the developed world have slammed the door on others. Gold might be globalizable, but not if scientific publishers insist on inflated profit margins. Only by unleashing digitality's potential to lower dissemination costs would gold be possible as a universal solution. If not, another form of open access is needed that cuts publication costs and provides a refuge for those locked out of the current science-oriented approach.

What Value Do Publishers Add?

Some publishers have done well out of gold access. And for nonscholarly content, the legacy industry remains fit for purpose. For academic work that seeks openness but finds publishing fees unaffordable, new solutions are needed. Before getting to them, let us ponder what publishers bring to the table. The question Ronald Coase famously posed to corporations can profitably be asked of publishers: Why do they exist? Could not the activities they unite under one roof equally well be sourced individually on the market? Publishers are arguably the least important of the participants helping to transfer work from an author's mind to its public. Most of the functions they have bundled together can be split off and outsourced. They are not among the irreplaceable actors—the authors above all, but also the reviewers, and for science, the funders. The journals need the scholars much more than the scholars, the journals.[20] And yet, the publishers make the most strident demands, not just for their cut, but often the rights, too.

From an author's vantage, the point is not to be published but to be read. From the reader's, the aim is not to buy a book but to be put in useful contact with new ideas. Can this be achieved otherwise? Whether a tree falling unheard in a forest makes a noise depends on how we define sound—as mere vibrations in air or their

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perception as well. But a book issued to no readership might as well never have been published. "Stillborn from the press," was Hume's sardonic description of the impact of his *Treatise of Human Nature* in his own lifetime.[21] Publication aims to make the work read, known, and impactful. Otherwise, it is pointless. Hume's comment implies that a work's readership may also await it later. Still, until it finds that audience, no one except author and publisher will even know it exists.

But works can have an effect even without being published in the conventional sense. During the Cold War, samizdat writings circulated the East Bloc in typescript, and carbon paper was the technology of enlightenment. The Odessa copy of Mikhail Bulgakov's *Heart of a Dog* was handled to shreds.[22] As homebrew can inebriate, so typescript can enlighten. Many samizdat works eventually made their way to the West for proper publication, both in their original tongue and translation. Pasternak's *Doctor Zhivago* and Solzhenitsyn's *Gulag Archipelago* were among the best known. And in today's autocratic regimes, turbocharged only by the advance from carbon paper to xeroxing, such clandestine dissemination continues—Nabokov's *Lolita* in puritanical Iran, for example.[23]

Even in the West, works not actually published have had a huge impact. Saul Kripke's foundational *Naming and Necessity* circulated for a decade as a typescript of three lectures given at Princeton in 1970. In 1972, a version emerged in an 800-page conference proceedings.[24] Because that was a pricey Springer edition, the underground typescript enjoyed a prolonged half-life, re-xeroxed among philosophy students and faculty, until a version was published as a stand-alone by Harvard in 1980. Faced with the difficulty of breaking publishers' monopoly, some have proposed a neo-samizdat system of homemade publishing.[25]

Admittedly, published books are more efficient than underground typescripts, and digital downloads, even more so. As disseminators, publishers therefore add value. What else? Digital

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dissemination eliminates the cost of the last marginal copy, which in the paper world still entailed the expense of its materiality. But it does not remove the cost of producing the first copy. Indeed, it adds new expenses, such as metadata needed for discoverability, storage, and software upgrading. What of such expenses?

Some of them have decreased. Digitality has democratized sound recording and film. Much of what used to require professional sound stages, mixers, cameras, and editing equipment is today available on laptops. Many of what were once the book trade's technical skills are now a mouse click away. Indexing is sometimes listed as a publisher contribution to the process, but presses foist that cost or effort onto authors, and journals are rarely indexed.[26] With text digitally searchable, what value does an index add? Supplying the metadata needed for discoverability remains a cost as well, although again, as with indexing, providing the search terms is a task expected of authors.

Publishers have also traditionally supplied copyediting, seeking to issue a crisp flawless work. But that can be done by others. Most copyeditors today are freelancers, roped in by the task, and their services are available to anyone willing to pay. Much of what they do has, in any case, been automated. Spell-checking and grammar software catches many of the mistakes copyeditors once earned their keep by correcting. It would be unfair to say that being a copyeditor these days is akin to being an elevator operator in a push-button lift, but much of the task has been accomplished before submission. In any case, presses have no monopoly on this function. As any published author can attest, copyediting varies from inspired and improving to an actual downgrade in quality.

That leaves layout as a publisher's contribution. This is largely an aesthetic question. Science journals are usually two or three columns of text, cramming much on a single page, with margins reduced to an afterthought. As an aside, scientific journals have not pondered the transition from paper to screen enough. While fine

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for reading a paper page, multiple columns of text are almost impossible to peruse on screen without an annoyingly constant scrolling up, down, and sideways. On screen, space is free. Only on paper does it have to be saved. The sooner publishers figure this out, the happier readers will be. Humanities and social science scholars are more interested in the aesthetic aspects of publication.

Still, any laptop can now produce almost publishable text. For those who sweat the details of book-level output, a little more effort and software are required. But broadly, anyone can do their own layout, producing pages that withstand bibliophilic scrutiny. For readers, this is a historic reversal of entropy. Those of a certain age will remember the nadir of scholarly publishing in the early 1980s, just before widespread word processing. Presses such as SAGE and Croom Helm then issued books that were little more than xeroxed typescripts—complete with Tipp-Exed corrections—in hardcovers at eye-watering prices. That was the worst of all worlds, bound volumes that looked like first-draft manuscripts. Today, everyone can produce camera-ready copy. Indeed, some publishers, such as Palgrave, charge three-figure prices for books that look suspiciously like what the authors submitted.

We have already examined the publisher's contribution to providing a version of record and found it to be less important in the digital era. Authors bring the final manuscript to the table. After that follows the publishers' value add: peer review, copyediting, and typesetting. Is the difference between the author's accepted manuscript and the version of record sufficient to justify the massive increase in cost from zero to list?

The publishers' main functions can all be outsourced or done by any author with patience and modest resources. Even peer review can be hired in.[27] Publishers' experiments with expedited peer review for an extra fee suggest how separable from their workflow it is.[28] Whether outsourced peer review is affordable is another matter. Peer review is normally done for free or nominal payment, but

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only within the mutual scholarly self-evaluation that publishers piggyback on. Once commercialized and extracted from the academic gift economy, reviewers will likely demand a living wage, and its cost will approach market rates. Research Square's rates in 2013 were $500 to $700 per article.[29] One hates to imagine what a book costs.

As publishers' various functions can all be decoupled and assigned other players, they need not be united in one hand,[30] Self-publication on Amazon reveals how dissemination without bells and whistles can be streamlined and economized. A perfectly adequate physical book, adorned with a cover design and ISBN, can be produced for a high three-figure sum.[31] A modest sales price can recoup such expenses. For an average-sized paperback of 300 pages, Amazon calculates a price of perhaps $5.00 per copy—less than the cost of xeroxing.[32] For digital editions, readable with Kindle software, Amazon requires a minimum price of 99¢.[33] But slightly surreptitious ways also allow authors to make their works permanently free.[34]

Other self-publishing enterprises, such as AuthorHouse, iUniverse, and Xlibris, offer publishing services for prices that span the gamut of three figures.[35] Smashwords, which publishes only digitally, charges authors nothing, taking 15% of the proceeds if there are any.[36] Assuming modest sales of physical editions, entrepreneurial authors could publish books so as to cost them nothing while providing anyone willing to read digitally with gratis access

Besides producing the physical book and providing peer review, publishers' crucial function in the analog era was dissemination. Delivering it to stores was the first step, but making the world aware of the book's existence was also important. This meant submitting copies for press review, advertising it, and positioning authors to call attention to their work—with talks, lectures, conferences, chat shows, and so forth. Websites, blogs, e-mail footers, and the like

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have been added in the digital era. For academic works, publicity is not a publisher's major concern. Mostly, they submit copies to prominent journals in the field and, if ambitious, to some popular periodicals and newspapers. Yet the disparity between supply and demand is so stark that the likelihood of any given book receiving attention outside the scholarly organs is minuscule.

In the major Anglophone outlets, at best around 3,000 books are reviewed annually, out of 500,000 total published in the US and UK.[37] If we adjust to eliminate duplicates, let us assume the total is some 350,000. Thus, scarcely 1% are reviewed in the major press. Even if we doubled this figure to include the second rank of reviewing, the problem remains.

Of more interest to scholars are reviews in specialized journals. These provide blurbs for eventual paperback editions and evidence for the promotion file. The likelihood of sales being driven by colleagues' reviews is small, but some accretion of scholarly readers is possible. Oprah may be able singlehandedly to make a bestseller by including a book on her program, but little of that nature exists in the scholarly world. Charlie Rose was the closest approximation American TV had to French programs such as *Apostrophes* and *Bouillon de culture*, or *Bookmark* on the BBC, where serious authors were taken seriously, but he has not been replaced after his fall from grace.

Other forms of publicity barely concern scholarly books. What academic publishers mean by advertising is not much. At best, a book's dust cover gets a grainy thumbnail image, the title scarcely visible, the author's name often not at all. These are usually strung out in a kind of literary police line-up with half a dozen other culprits on a quarter-page ad at the back of a professional journal or—if lucky—in a book review outlet. Getting works noticed is important. Yet, academic publishers would be ill advised to claim this as one of their strong points.

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Cosmic Postings

Publishers launch books with a few desultory attempts to make their presence known and some fond wishes for Godspeed en route to finding readers. We might call this the hunter-and-prey model. A hare is set running, and perhaps some foxes will notice and set out in pursuit. But what if, to stick with animal feeding analogies, content is a meadow, seeded with various plants among which herbivores graze, picking what appeals to them, ignoring the rest?

Imagine content uploaded to a vast site, host to every work. Authors could post in any format, from barebones typescripts as found on arXiv to the output of elaborate typesetting programs rivaling the timeless elegance of Clarendon volumes.[38] With works in the ether, authors can then seek to draw attention. But success connecting with readers is more likely to come from the demand side, as improved search engines alert audiences to the presence of new material. Precisely how the work is consumed would then be the reader's choice. A proper paper version of books or articles could be produced and mailed for a fee. Otherwise, PDFs or e-books could download to devices, or the work be read on-screen.

Such ideas have been with us for years. Stevan Harnad anticipated the possibility of a global bulletin board in 1990, early days of the internet. With authors' newfound ability to e-mail manuscripts to colleagues, they could hope for comments, suggestions, and revisions. Others would be drawn into an expansive process of bringing ideas to fruition—what Harnad termed scholarly skywriting.[39] Later, as the web matured, he imagined posting manuscripts in the ether, accessible to anyone and thus disseminated, if not published in the conventional sense.[40] Digital archives hosting e-prints allowed researchers to sidestep publishers altogether, posting their work individually and immediately. In 1994, Paul Ginsparg suggested that repositories could apply different levels of filtering, with both refereed and unvetted content.[41] A few years

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later, Robert Cameron imagined a vast cloud repository, connecting texts to all their references in a seamless whole.[42] The Budapest Open Access Initiative in 2002 pointed out that if individuals posting manuscripts followed standardized protocols, search engines would treat each independent archive as one undifferentiated mass of content.[43]

A global bulletin board of content would be but the first step in a differentiated dissemination process. Some works would never leave it. Databases, document collections, archives, letters, memoirs, and, more generally, the material that is not often read but is now available to all could simply remain in the cloud. Other content could descend from the cloud to assume physical form, should there prove to be interest or even a market.

In effect, we have something like this already in place for doctoral dissertations. In analog days, dissertations reposed in their university's libraries or archives, largely inaccessible except to those who could gain admission. Some nations, such as Germany, require dissertations to be published. That has spawned a strange mutant industry specializing in issuing dissertations in the few copies demanded by university regulations. Before digitality, these publishers were, in effect, glorified xeroxers and binders.[44] But they did manage to distribute a few copies among research libraries. In the meantime, the end product has improved. Digitality has made dissertations more widely available. Nonetheless, the publication requirement for Germany's 30,000 annual dissertations puts an upper limit on quality. KIT Scientific Publishing from the Karlsruher Institut für Technologie is the largest German open-access press, and 70% of its list is unrevised dissertations.[45]

In the Anglophone world, dissertations remain typescripts. As of 1938, University Microfilms International began microfilming most US dissertations. Subsequently, it was bought by ProQuest, which now supplies copies of digitized dissertations for a fee.[46] Something similar is the case in the UK.[47]

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In the meantime, the issue has become whether recently minted PhDs should be allowed to embargo their dissertations. If they are revising the dissertation for publication, authors may prefer to keep it private until the book has appeared.[48] But the public may be keen to read new research findings. How long should an embargo last? Should the fact that doctoral students may have received scholarships influence the decision? The majority of ProQuest's electronic dissertations are not embargoed. That is less true in France and Germany.[49]

Whatever the outcome of this dispute, the dissertation ecosystem foreshadows what might hold for works more generally. Most dissertations remain typescripts, posted and available in their original state. Some are revised and recombined into other formats. They may have been, or become, articles. That holds especially in the sciences and harder social sciences, where a dissertation increasingly consists of a few published articles. Finally, some dissertations are turned into books, properly speaking

All dissertations are thus available in the cloud and in various other formats for those that are revised and subsequently published. Why could something similar not apply to all content on the global bulletin board? Everything should be readable, but not everything must be an article or book, any more than every book must be a printed volume, or every printed volume a leather-bound artifact. With the long tail of content coiled in the cloud, the fat end, commanding larger audiences, descends to assume earthly form. As on-screen reading becomes ubiquitous and typesetting software more user-friendly and sophisticated, the distinction between outcomes will blur, whether in the cloud or on paper. On the Kindle or its future flat, foldable, stick-in-your-pocket, digital-paper versions, the just-filed dissertation will increasingly resemble Belknap's output.

Once content migrates to our still-imaginary global bulletin board, the consequences will be profound. Bookstores will remain as outlets for trade books. Libraries will be relieved of most

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processing and storage functions, except for the trade books that, still sold, require a lending institution. Publishers will issue content that has been test-run in its cloud versions. Like farmers watering their fields, they will draw from the global intellectual aquifer. Editions will likely be smaller and their sales more predictable. Best of all, information will be equally available everywhere.

What would a global bulletin board cost? ArXiv merely hosts works that are posted, without reviewing, curating, or otherwise incurring costs. It has an annual budget of $2 million, and uploading an article costs $7 to $10.[50] At three million articles globally a year, that is $30 million. Since size matters little in the cloud, let us assume that books are only fractionally more expensive and go with $20 for each of the globe's 2.2 million annual books, or another $40 million. Even if costs for what would now be the world's content came to $100 million annually, this would be about 2% of the US library system's total acquisitions budgets. If the US's fraction of library spending is proportionate to its role in global publishing (about 14%), the cost of our celestial bulletin board would be a vanishing part of current acquisitions expenditure.

That would be just the start. Posting a typescript would be practically costless, and anyone could read that version for free. Authors interested in more bells and whistles would seek or supply the resources for improvement. Readers, too, could upgrade matters, much as sports fans bring cushions to stadium seats, airline travelers, neck pillows, and opera buffs, binocs. A hardscrabble typescript could be upgraded at will. Auto-typesetting programs will housetrain raw manuscripts. Readers themselves can improve content they read. In the eighteenth century, books were sold sheathed only in paper, since wealthy buyers bound them to match their libraries. Today, the average listener jacks up the bass on a song.

If the old model was supply-side publishing, this will be on-demand. Readers will be like shoppers at a farmers market choosing their vegetables. Rather than grabbing canned soup off the

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supermarket shelf, consumers will home cook their content. The global bulletin board will supply the intellectual raw materials readers consume—as, when, and how they please.

For works that prove to have public appeal, publishers could team up with authors to offer premium editions for a fee, much as cars upgraded with the fanciest options are perhaps a third more expensive than basic models. Analog foreshadowings already exist. Dan Brown's blockbuster novels are issued in higher-priced editions with illustrations of the artworks and scientific apparatus mentioned in them. Annotated versions of classic works—*Alice in Wonderland*, *Huckleberry Finn*, *Sherlock Holmes*—add interesting background detail for a price.[51] Digitality expands the realm of value-add. Literary agents would earn their keep by reading widely on the web, searching for nuggets not yet mined.

Mega-Journals

Scientific mega-journals are a first approximation of such a global bulletin board. They raise the question: What is the need for 53,000 different scientific journals?[52] Why reproduce the editorial machinery over and over? Journals specialized by subject or theme are, after all, but a first approximation of an index of their content. And that is assuming that journals are specialized rather than generalist. How much wider can you get, after all, than *Science*, unless it is *Nature*?

Following the logic of the old joke about searching for our car keys under the streetlight's illumination regardless of where we actually lost them, we go to where the title of a periodical suggests something interesting. Journals of entomology and etymology promise different fare. Why duplicate all that effort? A few mega-journals could serve the same function. In the end, one global bulletin board would do so even better—the ultimate mega-journal.[53]

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We appreciate the quaintness of discrete establishments selling different wares or foodstuffs when at leisure on vacation, but in our daily lives, we head for the supermarket or department store.

Analogously, we have been liberated from the tyranny of the music album, with one or two good songs packaged along with the dross. The cornucopia of Spotify and Apple Music are the mega-journals of music. Worse than the subscription journals, with only a few articles of interest, are the edited volumes. At eye-watering prices, they contain only a chapter or two pertinent to any given reader. Often they are not available even to scholars through their university collections. Why not just bury your work in the garden?[54] Fortunately, that is slowly changing, as publishers unbundle books to sell chapters individually, and libraries subscribe to publishers' packages of volumes.

The effects of selecting precisely what we want are yet unclear. Some songs, articles, or chapters appeal to some people, others not. Insofar as each one is consumed by someone, everything is fine. But inevitably, some content will simply never be touched. Furthermore, we will be able to identify which content has resonance. The B sides of singles and the academic wallflowers among articles will slide down the long tail. Yet, thanks to costless storage, they will remain findable. As tastes change and tomorrow's scholars research currently unexpected topics, everything can hope for a future Cinderella moment.

Starting in 2000, mega-journals have become established features of digital publishing. In 2012, they issued some 47,000 articles annually. *PLOS One* was the first, but now an entire ecosystem has sprung up: *Scientific Reports*, *BMJ Open*, *PeerJ*, the BioMed Central Series, *Nature*'s "*Frontiers in. . .*," *AIP Advances*, the *Open Library of the Humanities*, *SAGE Open, F1000*, and about one-third of Hindawi's output.[55] For most of their content, they are the last step on dissemination's road. A few articles are sometimes poached for inclusion

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in overlay journals (something we touch on below). Latin America's SciElo functions much like a mega-journal, aggregating 1,500 journals and making their content available through its portal.[56]

Many mega-journals are perfectly reputable scholarly outlets, heralding a change in format but not quality. Their ample size testifies not to lowered standards but to a more capacious embrace. Mega-journals accept a broad range of submissions, unconcerned with limiting individual issues to a certain size or focusing on particular topics. In contrast, subscription journals, with their income fixed and already collected, have no incentive to expand capacity if submissions increase. They adjust to enhanced supply by dialing up selectivity or lengthening waiting times. But in the digital world, a journal can appear whenever it wants, however many submissions it has accepted. Slim or plus-sized, it matters not. The concepts of volumes and issues are inheritances from the paper era that have little meaning in digitality. Indeed, appearing as they please, mega-journals are less *periodicals,* in the technical sense of publishing to a schedule, than they are *sporadics*.

Nor do digital journals have to be picky about their subject matter. In the analog world with its space constraints, specialization served an editorial and filtering function. Postwar scientific publishers produced niche journals, supplying micromarkets.[57] Anyone for a subscription to the *Nordic Wittgenstein Review*, the *Latin American Journal of Aquatic Mammals,* or the *Indonesian Journal of Accounting Research*? With such laser focus, specialization became part of the editorial process. Regardless of quality, submissions could be rejected for not fitting in. Conversely, how fierce was the competition for attention in such circumscribed niches?

Early open journals were also specialized. But gradually, it became clear that the new medium did not require arbitrary boundaries. Since digital journals had no physical constraints—no size limits imposed by the cost of paper, binding, and postage—they could expand like a gentleman wearing Sansabelt trousers. Mega-journals

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can accommodate any number of articles. Nor is there reason to prissily police subject matter borders.[58] Hence they grow ever larger. *BMJ Open*, for example, published 97 papers in its first year and 1,143 four years later. In the print era, few journals have ever published more than 1,000 articles annually.[59] *PLOS One*, probably the largest mega-journal, published almost 32,000 articles in 2013, its peak so far. In 2014, *Medicine* transitioned from being a conventional selective journal to mega status. The 1,694 articles it published in 2015 were more than its total output for the previous half-century.[60]

Mega-journals are much like digital repositories, and drawing clear lines between the two is difficult. Both are cheaper than regular open journals. Repositories generally cost little, some $7 to $10 per hosted article for arXiv. Assuming that posted articles will eventually be published in journals, they typically impose no review. Mega-journals charge publishing fees, but usually much lower than for other open journals—often slightly more than $1,000.

Content undergoes only abbreviated peer review. Checking for basic coherence, logic, argument, presentation, soundness, and sense, they do not evaluate the work's broader significance, estimate what impact it might have, judge its novelty, or determine other subjective qualities.[61] All that is assumed to be the task of future postpublication reviewers. "Soundness not significance" is their criterion of acceptance.[62]

Setting few hurdles to dissemination, mega-journals are useful for the kind of work that rarely found accommodation in more rationed outlets. Journals with space constraints shy away from content that does not lay claim to new contributions. Yet, much of science is—or ought to be—kicking the tires, testing claims. Though it lacks sizzling novelty, reporting negative outcomes at least spares others from pursuing dead ends. Arguably, science's grunt-work is double-checking striking but improbable first results.[63] In mega-journals, such useful but uncelebrated work finds an outlet.[64] The same holds for work that used to be published preliminarily to

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establish precedence and then again—often with few changes—when completed. Such redundant publication no longer needs to clog the airwaves of more formal outlets.

So-called overlay journals select and curate previously posted articles, sorting and improving them in new venues. They anticipate a potential merger of gold and green access.[65] All content could be posted in the author's version of the manuscript. Overlay journals interested in curating, improving, promoting, or otherwise amplifying extracts poached from the content commons then work their magic with extra funding. Reviewed work—before or after—could be so indicated, possibly attracting more eyes. From the reader's vantage, overlay journals draw attention to curated and enhanced versions. From the author's standpoint, they serve the credentialing functions currently performed by selective subscription or gold journals. We return to them in the next chapter.

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Athena Unbound

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By: Peter Baldwin

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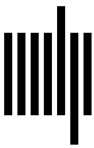

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