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How to Fast-Forward Learned Serials to the Inevitable and the Optimal for Scholars and Scientists

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ABSTRACT: *There is no conflict of interest between a trade author and a trade publisher. The trade author's product is his text, and the trade publisher produces and sells it for him, so they can both make a fair profit. Both wish to protect their product from theft; both wish to restrict access to those have paid for it. Contrast this with the specialised scientific and scholarly research literature: The research has been funded by a governmental research supporting agency or a public institution of higher learning and the results are meant to be made publicly available, especially so that other specialists can read and build further research on it. Through this cycle of research/report/research, all of humanity benefits from the fruits of learned inquiry. But because of the substantial real cost of producing print on paper in the Gutenberg era, research publication had to adopt the same economic model as trade publication: Researchers, who were not writing to sell their words, and would gladly have given them away to reach the eyes of their fellow researchers the world over, in their joint enterprise of broadening human knowledge, were forced instead to make the "Faustian Bargain" of transferring copyright to their publishers, who would then try to recover their substantial expenses plus a fair profit by selling those words as if they had been produced for trade. Research libraries the world over paid the hefty price, purchasing all the important journals so that each individual article could find its own small, scattered readership in perpetuum. This era is now potentially over: The much lower cost and much broader reach of electronic publication can free research from the counterproductive access boundaries imposed by the trade model. Research grants can now easily afford to cover the minimal marginal cost of electronic publication, making the research literature free for all, as it was always meant to be, with the growth of human knowledge no longer needlessly restrained by the Faustian Bargain and humankind the greatest beneficiary.*

Here are four recommendations to governments and institutions of research and higher learning, if they wish to help fast-forward learned serials to the inevitable and the optimal for scholars and scientists (Harnad 1995a,f; Odlyzko 1995)):

(1) Make sure to make and keep the Net free for researchers.

In the huge growth of the Internet the relative proportion of research use has shrunk to the size of the flea

on the tail of the dog: All of humankind would benefit much more from giving the flea a free ride than from extracting a toll from it; let the much larger commercial use of the Net subsidise the continuing contributions of the Nets creator, Research.

(2) Subsidise global electronic preprint archives in all learned disciplines.

This is a critical factor in accelerating the transition of the research literature to the Net. Paul Ginsparg's (1994) Physics Eprint Archive at Los Alamos (<http://xxx.lanl.gov>), now being generalised (Harnad 1995c) to the Cognitive Sciences at Southampton (<http://cogprints.soton.ac.uk>), should be the model for this. The start-up investment is tiny, the archives will be soon be mirrored worldwide and virtually self-sustaining, and the dividends will be huge, as the entire research community in all disciplines will naturally adopt the new medium as its primary means of access to the learned literature.

(3) Extend all research support grants to mandate and cover the page costs of publishing the findings in refereed electronic journals.

For less than 30% of the page cost of paper publication, this would make the refereed publication of research publicly available for free to everyone and would significantly hasten the transition of the entire literature to the electronic medium Harnad 1995b; cf. Garson 1995).

(4) Formally support electronic refereed publication in assessing the research publication productivity of universities to determine levels of support.

In assessing universities research productivity, as in the UK's Research Assessment Exercises, giving full weight to refereed publication in electronic journals will be critical in ensuring researchers that full credit will be given for publication in nonpaper journals.

Supporting Arguments and Evidence:

To understand why the transition of the refereed research journal literature to electronic form is both optimal and inevitable, one must understand the Faustian Bargain that researchers are currently obliged to make, and to understand why this bargain is Faustian, one must make a clear distinction between trade and nontrade publication. Unless one recognises and makes this distinction, one cannot make sense of either the profound conflict of interest that is inherent in the current means of publishing research findings, nor can one see why the ultimate outcome is both inevitable and optimal for researchers. Once it is apparent that the outcome is both optimal and inevitable, it will also be apparent that the only variable is time: Will it happen sooner or later? If it is recognised that the sooner the transition, the sooner the benefits -- to research, to researchers, and to the ultimate beneficiaries of research: humankind -- then it should also be clear that governments are now in a unique position to lead and accelerate the process.

Although the four recommendations are also applicable to research monographs and edited conference proceedings, it will be restricted to the research periodical literature; indeed, we will do our reckoning in terms of individual articles. It will become apparent why this is the right unit of reckoning shortly. But let it not be thought that this restriction means we are referring to a small literature: The primary scientific periodical corpus is huge, and growing. The ~7000 journals indexed in Science Citation Index are perhaps its core, but there are at least as many journals in its periphery; and if one includes the periodical literature in all other learned disciplines, in all languages, the numbers are still greater.

The trade/nontrade distinction:

There is a very simple and reliable test of whether a text is trade or nontrade: (1) Did the author write it in

order to sell his words? (2) Is there a market to buy them? For if the answer to both of these is yes, then the text is a trade text and the present proposal is completely irrelevant to it, to its author, to its publisher, and to its readership. If the answer is no, however, if, on the contrary, the author did not write the text to sell it -- if he would, in fact, be happy to give it away, and would even go to the length of paying to have it reproduced and mailed (regular, snail mail) in the form of preprints and reprints to those who request it, and would even pay page-charges to have it published more quickly -- then we are dealing with a piece of nontrade text.

The Faustian Bargain:

Why would an author want to give away his text, or even pay to distribute it? To understand this one has to understand why anyone would want to be a scientist or a scholar, rather than an author of best-selling novels, or perhaps a stockbroker, in the first place. One cannot answer such questions; but given that someone has chosen the path of learned inquiry, there is one critical consequence: Learned inquiry is not a solipsistic enterprise. One builds on the work of others, and one works in the hope that others will build on one's own contribution. For this to be possible, the work must be available, in perpetuum, to one's fellow scholars and scientists, present and future. Very few of them will ever want or need to read any given article (this is why it is so important to note that it is the article, rather than some other entity, that is the proper unit of reckoning), but for those few who might, wherever they might be, and whenever they might need it, the article must be accessible, ubiquitously, and in perpetuum.

Now in the Gutenberg Era of print on paper, the only way to ensure that an article reached its potential readership was to publish it in a paper periodical, which required a substantial investment by the publisher, as substantial as it would have been if the article had been written for trade. And in order to recover the cost of that investment, and to make a fair profit on it, the publisher had to protect it from theft. The author was accordingly required to assign copyright to the publisher, who would then charge for access to the text.

That was the Faustian Bargain: out of the necessity of reaching its small potential readership anywhere, at any time, the article's author had to collude in a restriction of access to those who paid, exactly like a trade author. Yet, unlike a trade author, the research author was not paid any royalties, nor would he have wanted to be paid; he would have been much happier to redirect those meagre revenues towards wider and less restricted access. Moreover, the market was for the most part not the small number of readers of that particular article, but a captive population of research libraries who had to subscribe to as many of the core journals as they could afford, to ensure that the research literature was available to their researchers. As periodical prices rose, the research author became more and more a victim of the Faustian Bargain, seeing access to his work become more and more restricted to the remaining libraries that could afford to subscribe to it, the rest trying to access it by the slow, cumbersome, and likewise expensive medium of interlibrary loan (usually in the form of mailed photocopies in the case of periodical articles).

It should be clear that if the goal of research PUBLICATION is to make public one's research findings, then this goal was always ill-served by the paper medium, and has become increasingly so as the volume of research increases, and with it the price of research periodicals.

It is also important to note how small the readership of any given research article really is: This is a nontrade medium. If an article is read by only 10 or 20 specialists the world over, this is not a sign that something has failed the test of supply and demand: The research literature is an interaction among experts working for the benefit of us all. It is not necessary that their reports be candidates for a best-seller list. But if the means of dissemination denies access to even 10% of its tiny potential readership (and one must multiply this across all published articles), then the cumulative goal of research will have been disserved. Conversely, if a new means of dissemination could increase its readership by even 5

readers, that would be a 25-50% gain in such a small population!

There was no alternative to the Faustian Bargain in the Gutenberg era, because of the high cost and inefficient reach of print on paper. This era is now over: So why has research periodical publication not shaken off its Faustian shackles and taken to the skies of the PostGutenberg Galaxy (Harnad 1991, 1995d)? There are 4 main obstacles, and each component of the present proposal addresses one of them:

(1) Researchers are afraid that eventually a price tag may be attached to their net use, so they dare not become too reliant on it in their reading; nor do they dare to entrust their intellectual goods, their articles, to a medium that could become inaccessible to them and to their readership. This fear could be removed by an explicit intergovernmental commitment to keeping the Net free for researchers.

(2) Researchers are reluctant to distribute their work electronically before publication for several reasons:

(a) They are afraid it may be regarded as prior publication, so refereed journals will refuse to publish it. (Implementing recommendations (3) and (4) together with a clearer sense of the epistemic role of unrefereed preprints as opposed to refereed, revised, published reprints would fully assuage this fear.)

(b) Given the anarchic quality of so much of the material on the Net, researchers are reluctant to consign their work to such a medium, akin to a global graffiti board. (Again, the remedy is implementing recommendations (3) and (4), increasing the number of Eprint Archives (2) and their coverage of the many different learned disciplines, and providing a reputable profile for Eprint Archives through systematic institutional support.)

(c) Researchers fear that publicly posting their preprints may lead to plagiarism and loss of priority and credit for their work. (The remedy is again to strength and raise the profile of the Archives, providing password-protected date-stamping and permanent archiving to resolve any subsequent priority questions: With its powerful search and analysis tools, the Net can protect priority and detect plagiarism more powerfully than paper ever could. -- In general, it seems to have been the pattern so far that whatever new problem or vulnerability the Net breeds, it also breeds even more powerful means of remedying the problem and combating the vulnerability.)

(3) Researchers are reluctant to submit their work to electronic journals because: (a) They are afraid they will not get credit for their work. (Remedy is recommendation (4).) (b) They are afraid that the Electronic journals will not last and make their work available in perpetuum. (The remedy is again to support them, until their permanence becomes obvious; some common but completely unfounded worries about the permanence of the electronic medium itself, and its means of storage, are involved here; with distributed copies at many different sites, and mechanisms for backup and transfer to new storage technologies in place, the electronic medium can be made even more secure and permanent than paper, if we wish.)

(4) Researchers are afraid that electronic publication will be seen as less prestigious than paper. (Competing with the established journals is a problem even for new paper journals: a new medium is working under an even greater handicap. But the solution is to implement these four recommendations, for that will ensure that the prestigious paper journals likewise migrate to the Net, bringing their editorial boards and their prestige with them. Implementing recommendation 4 will help to facilitate this.)

As their work is launched into the PostGutenberg Galaxy, scholars and scientists will discover yet another benefit of the optimal and inevitable medium for learned inquiry: interactive publication (Harnad 1992; see Hayes et al. 1992). I have dubbed this feature "Scholarly Skywriting" (Harnad 1990, Garfield 1991). The learned literature on the Net will be sectorized into formal refereed publications (in a hierarchy of journals varying in the rigour of their peer review and hence their prestige, just as it is now in paper Harnad 1982, 1985, 1986, 1995b) and informal, unrefereed publications (Harnad 1995e). In BOTH sectors it will be possible to (respectively) publish and post commentaries and responses that will provide a rich source of feedback for researchers and (I have argued, on the basis of 19 years of editing a paper

journal of Open Peer Commentary and 6 years of editing a similar electronic journal) a further dimension for the cumulative, self-corrective process of learned inquiry, to the benefit of scholars and scientists' productivity (Harnad 1979, 1984, 1995c; Mahoney 1985). The main reason for this is that the Net has made it possible to reunite the slower, but more thoughtful and permanent medium of writing with the speed of human thought, which evolved in the service of online polyadic speech (see Harnad et al. 1976) rather than offline monadic script (Harnad 1991).

In closing, let me add that if governments and research institutions do not support this transition, it will happen anyway, as a much more Net-oriented generation is coming of age, but the delay will be a pity for the current generation of researchers, who will not be able to benefit from the PostGutenberg Galaxy. Their research lifelines will be much shorter than they need have been, and we will all be the poorer for it. For them it is doomed to remain: so near and yet so far.

Publishers, too, would benefit from adapting to the inevitable, rather than trying to delay it at all costs. They can delay it for a while, but the price for that will be that they will lose their role entirely, for as they keep trying to defend an indefensible trade model, the rival nontrade model, with author page charges replacing subscription charges, will again be implemented by a new generation of electronic-only publishers who will simply recruit to the new medium the editors and the all-important referees who form the backbone of refereed periodical publication. Publishers would be much better advised to cooperate in the transition, adopting rather than rejecting the page-charge and subsequent free-distribution model that they find so unnatural and unwelcome. In the conflict of interest that exists under the trade model for research publication, it is inevitable that research will win and paper publishers will lose if they persist in making it a conflict rather than a collaboration.

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