Chapter 7

The Post-Gutenberg Open Access Journal

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Some think the most radical feature of post-Gutenberg journals will be the fact that they are digital and online, but that would be a much more modest development if their contents were to continue to be kept behind financial firewalls, with access denied to all who cannot or will not pay the tolls. This chapter will show how the optimal and inevitable outcome – for scientific and scholarly research, researchers, their institutions and funders, the vast research and development industry, and the society whose taxes support science and scholarship and for whose benefit the research is conducted – will be that all published research articles will be openly accessible online, free for all would-be users webwide.

The classical learned journal

To understand the journal of the future, however, we must first understand the journal of the present. This chapter is exclusively about *refereed journals*, not about trade journals, magazines or newsletters. These journals publish only peer-reviewed scientific and scholarly research. According to Ulrich's, there are about 25,000 of them, publishing about 2.5 million articles per year, across all disciplines and in all languages. There are, however, some uncertainties about Ulrich's classification scheme and about the average article count for journals that are not indexed by Thompson-Reuters ISI (ISI journals average somewhat over 100 articles per year). With this in mind, Bjork et al. (2008) made a lower estimate of 23,750 journals and 1.35 million articles per year.

Refereed journals have the following properties:

1. *Peer review:* Every article published in these journals is first sent, by a qualified specialist editor or editorial board, to experts specialized in its subject matter. These experts are called 'referees' or 'peers' and are invited to review the submitted manuscript, determine whether its subject-matter and quality are potentially suitable for publication in the journal in question, and if so, to indicate what corrections and revisions (if any) need to be made so that it meets that journal's established quality standards for acceptance. Both the referees and the authors are answerable to the editors, who select which referee recommendations are binding, and who judge whether a revised draft has satisfied the recommendations. The editors and the journal title are in turn answerable to the journal's usership in establishing and maintaining the journal's quality standards. In most fields there are a number of journals, varying horizontally in terms of their focus and subject matter, and vertically in terms of their selectivity and quality standards, as maintained by the rigour of their peer review (Harnad, 1998a).
2. *Document production:* All articles that a journal accepts for publication are copy-edited (to varying degrees) and then marked up for publication – formerly only as print on paper, but nowadays most journals generate a digital document online.
3. *Access provision:* The journals provide access to their products, the journal articles, by selling (and in various ways delivering access through) annual subscriptions to the print edition or licences to the online edition. Journals often

also sell single issues, online or on paper, or even single articles (the 'pay-to-view' model). Although it varies by field, most journals make ends meet through institutional subscriptions and licences. Individual subscriptions exist too, but they are not what sustains the market for most journals.

4. *Archiving:* Both print and online editions have to be stored and preserved. Individual subscribers do what they want with their personal copies, but institutional libraries (as well as national deposit libraries) are responsible for the archival storage of print editions of journals. For the online edition there is still some inconsistency about who owns and preserves what, but both the libraries and the publishers are currently involved in storing and preserving both the print and the digital documents.
5. *Copyright:* Providing peer review, generating the final document, providing access to it online and on paper, and storing and preserving it, all have costs, most of them borne by the publisher. The customers – the libraries – also bear some of the storage and preservation costs for the paper and online edition they have purchased, but we will focus on publisher costs. The peers referee for free, but we will be focusing particularly on the costs of *implementing* peer review (processing submissions, selecting referees, adjudicating the referee reports, and adjudicating the revisions, including any editorial input). In order to cover all their publishing costs (1–4), some journal publishers may require the transfer of copyright from the author to the publisher to make it the exclusive vendor. This means no rival publisher can sell the same articles, and even the authors have to request permission from the publisher to reuse their own published writing in their own further publications.

Four of these five properties are also shared with other forms of publication; peer review, however, is unique to scientific and scholarly journal publishing (although some scholarly and scientific monographs may sometimes also be refereed by consultant specialists as rigorously as some journal articles). There are online editions of books, but they have not yet become as prevalent and as widely used as online versions of articles. The essential common point is that publishers seek to recover costs and make a profit through subscription sales and/or other revenue streams, and that they seek to protect and maximize those revenue streams through the transfer of copyright (from author to publisher).

Publishing for income vs publishing for impact

What, besides peer review itself, distinguishes the 2.5 million articles published every year in the world's 25,000 peer-reviewed journals from everything else that is published? It is the unusual nature of the authorship of those journals. The authors are all scientific and scholarly researchers, and none of them publish their articles for the sake of earning royalty income or fees from their sale. They publish them for one reason, and one reason only: so that their work will be read, used, applied and built upon by their fellow researchers worldwide. This is called 'research impact'. It is for the sake of research impact that researchers publish their findings instead of just putting them in a desk drawer (or not doing research at all). It is for the sake of research impact that their institutions and funders mandate that researchers should 'publish or perish'. It is for the sake of research impact that citizens support research with their taxes. And it is research impact that drives scientific and scholarly research progress (Harnad, 2001a).

Trade publishing

It is useful to contrast the special case of refereed research journals with most of the rest of the printed word. The authors of trade books do not write for research impact. Nor do the authors of newspaper and magazine articles. They write for fees or royalty income. Even the writers of scientific and scholarly textbooks – although they are often the authors of journal articles wearing other hats – write for royalty revenue rather than research impact. Some scholarly monographs –

in fields where the publish-or-perish mandate puts more weight on publishing books than on publishing journal articles – have a mixed agenda and will probably follow the same pattern as journals, eventually; but for now, because of the true costs of print-based publication and distribution, scholarly monographs are still reliant on the trade publishing model.

What is the trade publishing model? That the publisher tries to recover costs and make a fair profit by selling access to the joint product: the author's writing plus the publisher's editing, quality control, copy-editing, mark-up, and the generation and distribution of the text as print on paper. This is why copyright is transferred to publishers: so they can make good on their investment, sharing their profit with their authors.

Gutenberg toll-access

That, at least, was the picture in the Gutenberg era: the true costs of print production and distribution required a toll-booth to be erected between the document and the user. Access was sold, with publisher and author taking a share of the admission receipts. Writing, after all, was a trade, a way of earning a living, and so was publishing. Writers and publishers were no more interested in giving away their products than any other producer of any other good or service.

How has the post-Gutenberg era of digital documents and online access changed that? In principle, authors can now *give away* their writing, if they wish to (and can afford to). This is presumably what bloggers are doing. But despite all we are hearing about open source, open content, open access and Creative Commons licensing, both the writing and the publishing *trades* are still proceeding apace, pretty much as they had before. And this is largely because there remains a need to put bread on the table. The fact that it has recently become possible for authors to give away their writing in digital form on a global scale does not mean that most of them *wish* to do so (Harnad et al., 2000).

Reprint requests and author give-aways

The authors of peer-reviewed journal articles, however, represent an exception. Not only have they never sought or received income from the sales of their articles, but even back in Gutenberg times these special authors had the practice of mailing, at their own expense, free copies (reprints) of their articles to any would-be user who requested them. The reason, again, was research impact. Researchers do not earn their revenue from selling their articles but from having them widely read, used and cited. The publish-or-perish reward system of academia is not based merely on a brute publication count. Measures of impact are counted as well, chief among them being *citations*. For scholars and scientists, their employment, salaries, promotion, tenure, funding, prizes and prestige all depend on the degree of uptake and usage of their research findings.

Access barriers and impact barriers

For this special kind of author (the would-be give-way author), the access barriers of Gutenberg publishing – having to transfer copyright to the publisher and then let the publisher deny access to those who could not or would not pay – were always anathema, because *access barriers are impact barriers*. Yet these give-away authors had no choice but to enter

into this 'Faustian bargain' (not with the devil, but with Gutenberg's costly mechanism of access-provision and its resulting cost-recovery needs) as the inescapable price of having any research impact at all (beyond what they could manage by hand-mailing manuscripts) (Harnad 1994).

The post-Gutenberg galaxy

Impact-barriers were inescapable – until the post-Gutenberg era of digital documents and online access provision (Harnad, 1990, 1991). For as soon as it became technically possible, these give-away authors began making their research papers (before and after refereeing) accessible free for all, first through e-mail, then by 'self-archiving' them online (Harnad, 1995, 2001b) in order to make them open access -- first in 'anonymous ftp' archives, then on personal or central websites, and most recently in their own research institutions' interoperable, Open Access Initiative-(OAI)-compliant *institutional repositories* (Tansley and Harnad, 2000) so they could be harvested and jointly searched through search engines such as OAIster, Citeseer, Citebase, BASE, Scirus, Google Scholar and Google (Hitchcock et al., 2002). Studies have now repeatedly demonstrated that making articles open access can increase their citation impact, sometimes substantially (Brody et al., 2006; Gargouri et al., 2010; Hajjem et al., 2005; Harnad and Brody, 2004; Lawrence, 2001)

Open access (and almost open access)

The status quo (estimated in 2010) is that about 20 per cent of the 2.5 million peer-reviewed articles published annually are spontaneously being made open access by their authors (Laakso et al 2011; Poynder 2011). This will soon be changing, however, as universities and research institutions as well as research funders worldwide are extending their publish-or-perish mandates to mandate that the access to and the impact of those 2.5 million published articles should be maximized through author self-archiving (Harnad et al., 2003; Harnad 2011a). Over 200 universities and over 80 research funders worldwide (including Harvard and the US National Institutes of Health) have already mandated open access self-archiving (see the Registry of Open Access Repository Material Archiving Policies, ROARMAP). Over 90 per cent of journals have already adopted a 'full-green' or 'pale-green' open access policy, over 60 per cent of them endorsing the immediate self-archiving by their authors, of their own final refereed drafts, in their own open access institutional repositories (see SHERPA/ROMEO) (Harnad et al., 2004).

For the remaining 40 per cent of (pale-green) journals that endorse only unrefereed preprint self-archiving and still embargo open access to the refereed draft (for 6–12 months or more) or do not endorse any version being made open access at all, immediate research usage and impact needs can nevertheless be fulfilled almost immediately. For any institutional repository deposit that is inaccessible (because access to it is set as 'closed access' instead of open access, owing to publisher restrictions), the institutional repositories have a button that allows any would-be user to click to send an instant 'e-mail e-print request' to the author, who need only click to have the e-print instantly e-mailed to the requester by the repository software (Sale et al. 2012). This is not yet 100 per cent open access: only about 60 per cent open access + 40 per cent almost-open access. But as open access and open access mandates and the resulting usage and impact grow, author and user pressure will ensure that the optimal and inevitable outcome –100 per cent green open access – will soon follow.

Once all articles are made open access through author self-archiving, and all journals are fully green with regard to open access, what next? What has been described so far has either already happened or is about to happen with high probability. But beyond that point – the point that provides the barrier-free access, usage and impact that research and researchers need – we enter into the realm of speculation about the future of journal publishing, copyright and peer review. Although it is not possible to predict the outcome with any confidence, it is possible to anticipate the main contingencies.

Universal green open access may eventually make subscriptions unsustainable

In and of itself, universal green open access self-archiving simply means that any researcher whose institution cannot afford subscription access to the publisher's print or online edition of the journal in which a particular article happens to appear can henceforth access the author's refereed final draft online for free. No one knows how long the demand for the print edition or the publisher's proprietary PDF will continue to cover the costs of journal publishing. It has to be noted, however, that producing a print edition and the publisher's PDF itself costs money; thus, if and when the demand for the publisher's print and PDF versions should vanish, so will all the costs associated with print and PDF: the author's peer-reviewed, accepted final draft, self-archived in his institution's OAI-compliant institutional repository, will become the official, canonical draft, and expenses 2, 3 and 4 above (document production, access-provision and archiving) will either have vanished or been offloaded onto the author and the distributed network of open access institutional repositories. As a consequence, there will no longer be any need to transfer copyright to the publisher (5), nor to block access, usage and re-use. Journals will have eliminated the products and services for which there is no longer a demand in the PostGutenberg era, cutting costs and downsizing so that their only remaining expense will be the cost of implementing peer review (Harnad, 2001a, 2007).

Gold open access publishing

How much does it actually cost to implement peer review? The author provides the text and the revisions for free. The peers review for free. But a qualified editor must select the referees and adjudicate the referee reports and the revisions, and the online correspondence must be managed and coordinated. Currently, the cost per paper of implementing peer review has been estimated to be between $200–500 per accepted paper *if one factors the processing cost of rejected papers into the cost of accepted papers* (Doyle, 2001). There is a model for recovering this cost. It has already been tested for much higher costs: the full cost of current journal publication, per paper published. This ranges from $1,500 per paper for publishing online-only to $3,000 or more per paper if the print edition is bundled into the cost. Here, instead of the user-institution paying the publisher a subscription fee for a *product* – the incoming journal – the author-institution pays the publisher a publication fee for a *service* – publication – per outgoing article. This is called the 'gold' open access publishing cost-recovery model (Harnad, 1997a, 1998b, 1999).

There are already over 8,000 gold open access journals – journals that make their own articles freely accessible online. Not all of them charge for publication – in fact, the majority still make ends meet through subscriptions or subsidies. But a significant number of them are sustaining themselves purely by charging author-institution publication fees. The

problem is that with over 80 per cent of all 25,000 refereed journals still being subscription-based, the potential funds for paying institutional gold open access publication fees are currently committed to paying for institutional subscription fees. But if and when the availability of universal green open access were ever to eliminate the demand for the publisher's official version, on paper and online, making subscriptions unsustainable, then simple arithmetic shows that institutions would have at least three times as much annual windfall savings from their incoming journal subscription cancelations as they would need to pay the publication costs for their own outgoing articles – if all they had to pay for was peer review (Harnad, 2001a,b; 2007).

In other words, there is currently already enough institutional money changing hands to sustain current publication costs through subscriptions. If journals downsized to become just peer-review service-providers, institutions would save more than the money needed to pay for peer review alone, and in addition there would be substantial overall savings (Houghton et al 2009; Houghton & Oppenheim 2010; Harnad 2010b). This is if the cost of rejected articles continues to be bundled into the cost of accepted articles. But as we will see below, the cost can be made even lower than that, while providing still further benefits:

Would pay-to-publish lower peer-review standards?

Some have expressed a concern that if author-institutions pay to publish, then peer-review standards, hence quality, will decline, as journals will lower acceptance criteria in order to publish more papers so they can make more money. To a degree, something like this is already the case with subscription journals. There is a quality hierarchy: on the high end are the journals with high standards of quality and high selectivity (i.e., high rejection rates), and on the low end are journals that are virtually vanity presses, accepting almost everything submitted. These quality differences are known to all researchers, on the basis of the journals' track records (and often also their citation impact factors). Not only does publishing in a journal with low quality standards have less prestige – hence less 'publish-or-perish' value for the *author*'s career (e.g. in research performance evaluation) -- but *users* also know the journals' track records for quality, and avoid the journals whose contents are not reliable, which again is not good for authors, who are shopping for a journal that users will read and cite.

None of this will change with the journal's cost-recovery model. With gold open access publishing, it is the author-institution that pays for publication instead of the user-institution, but it is the peers who referee. Hence the journals that authors will most want to publish in, and that users will most want to use, will continue to be the highly selective journals with the track record for high-quality peer-review standards (and high usage and impact metrics).

Improving the efficiency of peer review while lowering its price

If anything, the cost of peer review per paper published will go down once open access prevails. Not only will more and more authors be making their papers available even before they are refereed, as preprints (the way many physicists and computer scientists have been doing for years), allowing pre-refereeing commentary to improve their quality and thereby reduce the burden on the referees, but the online medium will also make it easier for editors to pick referees and to distribute the refereeing load more evenly (Harnad, 1996, 2008).

It is premature, however, for universities and research funders to pay the costs of Gold OA publishing today. Funds are short. With 80 per cent of journals (including virtually all the top journals) still subscription-based, the potential funds to pay for Gold OA are still tied up in paying subscriptions. The asking price for Gold OA is still high. And there is concern that paying to publish may inflate acceptance rates and lower quality standards.

What is needed first is for universities and funders to mandate Green OA self-archiving (of authors' final peer-reviewed drafts, immediately upon acceptance for publication). That will provide immediate OA. Then, if and when universal Green OA should go on to make subscriptions unsustainable (because users are satisfied with just the Green OA versions) that will in turn induce journals to cut costs (print edition, online edition, access-provision, archiving), downsize to just providing the service of peer review, and convert to the Gold OA cost-recovery model. Meanwhile, the subscription cancellations will have released the funds to pay these residual service costs.

The natural way to charge for the service of peer review then will be on a 'no-fault basis', with the author's institution or funder paying for each round of refereeing, regardless of outcome (acceptance, revision/re-refereeing, or rejection). This will minimize cost, no longer bundling the costs of rejected manuscripts into the costs of accepted ones, while protecting against inflated acceptance rates and decline in quality standards (Harnad 2010a, 2011b).

Peer feedback after posting instead of peer filtering before publishing?

Some have made even more radical predictions, suggesting that refereeing (hence journals) will disappear completely once open access prevails, and that ad lib peer commentary will replace answerable peer review as the means of quality control. Having umpired a peer-reviewed, open peer commentary journal for a quarter of a century (Harnad, 1978, 1982), I am quite familiar with the difference between prepublication peer review, and postpublication peer commentary, and I very much doubt that the latter can replace the former (Harnad, 1997b, 1998a).

The critical difference is *answerability*. An author is answerable to the editor for meeting the referees' recommendations. With post hoc commentary, whether or not to meet commentators' recommendations is entirely up to the author. Furthermore, it is not at all clear whether self-appointed commentators are likely to be the qualified 'peers' in the way the editor-selected and answerable journal referees are. Nor is it clear whether raw, unfiltered drafts, along with self-appointed vetters' comments will yield a literature that researchers can navigate and use, allowing them to judge what is and is not reliable enough to be worth investing their finite time to read it, or to risk investing their even more precious time and effort in trying to use and build upon it. Not to mention that it is not clear what will play the role of the journal's name and prior track record for tagging quality in a world with just self-posted preprints and self-posted comments (the author's name and track-record?).

The post-Gutenberg journal: optimal and inevitable for research and researchers

Post-Gutenberg peer review will be far more powerful and efficient, but it will still be the natural, answerable, expert-based quality-control system for research findings that deserves to retain the name 'refereed journal'. What will really

distinguish post-Gutenberg journal publication will be that it will be openly accessible to all users webwide and an integral part of a global open research web, on which research data, research papers before and after peer review, open peer commentary, open research metrics and open data-mining will allow scholarly/scientific collaboration, interactivity and productivity at a speed, scope and scale that were unthinkable in the Gutenberg era (Harnad, 2003; Shadbolt et al., 2006).

Bibliography

Björk, B-C, Roos, A. and Lauri, M. (2008) 'Global annual volume of peer reviewed scholarly articles and the share available via different open access options', paper presented at ElPub 2008, Open Scholarship: Authority, Community and Sustainability in the Age of Web 2.0, Toronto, 25–27 June, available at: *http://www.oacs.shh.fi/publications/elpub-2008.pdf*.

Brody, T., Carr, L., Gingras, Y., Hajjem, C., Harnad, S. and Swan, A. (2007) 'Incentivizing the open access research web: publication-archiving, data-archiving and scientometrics', *CTWatch Quarterly* 3(3), available at: *http://eprints.ecs.soton.ac.uk/14418/*.

Brody, T., Harnad, S. and Carr, L. (2006) 'Earlier web usage statistics as predictors of later citation impact', *Journal of the American Association for Information Science and Technology (JASIST)* 57(8): 1060–72, available at: *http://eprints.ecs.soton.ac.uk/10713/*.

Doyle, M (2001) 'Peer-review alternatives for preprints, mechanisms', paper presented at the CERN Workshop on the Open Archives Initiative (OAI) and Peer Review Journals in Europe (OAI1), Geneva, March 22-24 2001, available at: *http://eprints.rclis.org/archive/00000921*.

Hajjem, C., Harnad, S. and Gingras, Y. (2005) 'Ten-year cross-disciplinary comparison of the growth of open access and how it increases research citation impact', *IEEE Data Engineering Bulletin* 28(4): 39–47, available at: *http://eprints.ecs.soton.ac.uk/11688/*.

Gargouri, Y., Hajjem, C., Lariviere, V., Gingras, Y., Brody, T., Carr, L. and Harnad, S. (2010) Self-Selected or Mandated, Open Access Increases Citation Impact for Higher Quality Research. *PLOS ONE* 5 (10) e13636 http://eprints.ecs.soton.ac.uk/18493/

Harnad, S. (1978) 'Editorial', *Behavioral and Brain Sciences* 1(1), available at: *http://www.ecs.soton.ac.uk/~harnad/Temp/Kata/bbs.editorial.html*.

Harnad, S. (ed.) (1982) *Peer Commentary on Peer Review: A Case Study in Scientific Quality Control*, New York: Cambridge University Press.

Harnad, S. (1990) 'Scholarly skywriting and the prepublication continuum of scientific inquiry', *Psychological Science* 1: 342–3, available at: *http://cogprints.org/1581/*.

Harnad, S. (1991) 'Post-Gutenberg galaxy: 'the fourth revolution in the means of production of knowledge', *Public-Access Computer Systems Review* 2(1): 39–53, available at: *http://cogprints.org/1580/*.

Harnad, S. (1995) 'I. Overture: The Subversive Proposal' and passim, in: A. Okerson and J. O'Donnell (eds) *Scholarly Journals at the Crossroads; A Subversive Proposal for Electronic Publishing*, Washington, DC: Association of Research Libraries, available at: *http://www.arl.org/sc/subversive/*.

Harnad, S. (1996) 'Implementing peer review on the net: scientific quality control in scholarly electronic journals', in: R. Peek and G. Newby (eds) *Scholarly Publishing: The Electronic Frontier*, Cambridge MA: MIT Press, pp. 103–18, available at: *http://cogprints.org/1692/*.

Harnad, S. (1997a) 'How to fast-forward serials to the inevitable and the optimal for scholars and scientists', *Serials Librarian* 30: 73–81, available at: *http://cogprints.org/1695/*.

Harnad, S. (1997b) 'Learned inquiry and the net: the role of peer review, peer commentary and copyright', *Learned Publishing* 11(4): 283–92, available at: *http://cogprints.org/1694/*.

Harnad, S. (1998a) 'The invisible hand of peer review', *Nature [online]*, 5 November, available at: *http://cogprints.org/1646/*.

Harnad, S. (1998b) 'On-line journals and financial fire-walls', *Nature* 395(6698): 127–8, available at: *http://cogprints.org/1699/*.

Harnad, S. (1999) 'Free at last: the future of peer-reviewed journals', *D-Lib Magazine* 5(12), available at: *http://cogprints.org/1685/*.

Harnad, S. (2001a) 'For whom the gate tolls?' Published as: Harnad, S. (2003) 'Open access to peer-reviewed research through author/institution self-archiving: maximizing research impact by maximizing online access', in: D. Law and J. Andrews (eds) *Digital Libraries: Policy Planning and Practice*, Surrey: Ashgate Publishing, pp. 63-98; available at: *http://cogprints.org/1639/*.

Harnad, S. (2001b) 'The self-archiving initiative', *Nature* 410: 1024–5, available at: *http://cogprints.org/1642/*.

Harnad, S. (2003) 'Back to the oral tradition through skywriting at the speed of thought', in: J.-M. Salaün and C. Vendendorpe (eds). *Les défis de la publication sur le web: hyperlectures, cybertextes et méta-éditions*. Paris: Presses de l'enssib, available at: *http://www.interdisciplines.org/defispublicationweb/papers/6*

Harnad, S. (2007) The Green Road to Open Access: A Leveraged Transition. In: Anna Gacs. *The Culture of Periodicals from the Perspective of the Electronic Age*. L'Harmattan. 99-106. http://eprints.ecs.soton.ac.uk/13309

Harnad, S. (2008) 'Post-Gutenberg peer review: the invariant essentials and the newfound efficiencies', available at: *http://users.ecs.soton.ac.uk/harnad/Temp/peerev.pdf*.

Harnad, S. (2010a) No-Fault Peer Review Charges: The Price of Selectivity Need Not Be Access Denied or Delayed. *D-Lib Magazine* 16 (7/8). http://eprints.ecs.soton.ac.uk/21348/

Harnad, S. (2010b) The Immediate Practical Implication of the Houghton Report: Provide Green Open Access Now. *Prometheus*, 28 (1). pp. 55-59. http://eprints.ecs.soton.ac.uk/18514

Harnad, S. (2011a) Open Access to Research: Changing Researcher Behavior Through University and Funder Mandates. *JEDEM Journal of Democracy and Open Government* 3 (1): 33-41. http://eprints.ecs.soton.ac.uk/22401/

Harnad, S. (2011b) Gold Open Access Publishing Must Not Be Allowed to Retard the Progress of Green Open Access Self-Archiving. *Logos: The Journal of the World Book Community*. 21(3-4): 86-93 http://eprints.ecs.soton.ac.uk/21818/

Harnad, S. and Brody, T. (2004) 'Comparing the impact of open access (OA) vs non-OA articles in the same journals' (Japanese translation), *D-Lib Magazine* 10(6), available at: *http://eprints.ecs.soton.ac.uk/10207/*.

Harnad, S., Brody, T., Vallieres, F., Carr, L., Hitchcock, S., Gingras, Y, Oppenheim, C., Stamerjohanns, H. and Hilf, E. (2004) 'The access/impact problem and the green and gold roads to open access', *Serials Review* 30, available at: *http://eprints.ecs.soton.ac.uk/10209/*.

Harnad, S., Carr, L., Brody, T. and Oppenheim, C. (2003) 'Mandated online RAE CVs linked to university eprint archives: improving the UK Research Assessment Exercise while making it cheaper and easier', *Ariadne 35*, available at: *http://www.ariadne.ac.uk/issue35/harnad/*.

Harnad, S., Varian, H. and Parks, R. (2000) 'Academic publishing in the online era: what will be for-fee and what will be for-free?' *Culture Machine* 2, available at: *http://cogprints.org/1700/*.

Hitchcock, S., Brody, T., Gutteridge, C., Carr, L., Hall, W., Harnad, S., Bergmark, D. and Lagoze, C. (2002) 'Open citation linking: the way forward', *D-Lib Magazine* 8(10), available at: *http://eprints.ecs.soton.ac.uk/7717/*.

Houghton, J.W. & Oppenheim, C. (2009) The Economic Implications of Alternative Publishing Models. *Prometheus* 26(1): 41-54 http://www.informaworld.com/smpp/content~db=all~content=a920247424

Houghton, J.W., Rasmussen, B., Sheehan, P.J., Oppenheim, C., Morris, A., Creaser, C., Greenwood, H., Summers, M. and Gourlay, A. (2009). Economic Implications of Alternative Scholarly Publishing Models: Exploring the Costs and Benefits, London and Bristol: *The Joint Information Systems Committee (JISC)* http://www.jisc.ac.uk/publications/reports/2009/economicpublishingmodelsfinalreport.aspx

Laakso M, Welling P, Bukvova H, Nyman L, Björk B-C, et al. (2011) The Development of Open Access Journal Publishing from 1993 to 2009. *PLoS ONE* 6(6): e20961. doi:10.1371/journal.pone.0020961

Lawrence, S. (2001) 'Online or invisible?' *Nature* 411(6837): 521, available at: *http://citeseer.ist.psu.edu/online-nature01/*.

Poynder, R (2011) Open Access by Numbers, *Open and Shut*, 19 June 2011 http://poynder.blogspot.com/2011/06/open-access-by-numbers.html

Shadbolt, N., Brody, T., Carr, L. and Harnad, S. (2006) 'The open research web: a preview of the optimal and the inevitable', in N. Jacobs (ed.) *Open Access: Key Strategic, Technical and Economic Aspects*, Oxford: Chandos, pp. 195-205; available at: *http://eprints.ecs.soton.ac.uk/12453/*.

Tansley, R. and Harnad, S. (2000) 'Eprints.org software for creating institutional and individual open archives', *D-Lib Magazine* 6(10), available at: *http://www.dlib.org/dlib/october00/10inbrief.html#HARNAD*.