

The highly profitable but unethical business of publishing medical research

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'Publishing is theft', the BMA librarian used to joke. I was arrested by the phrase when I first heard it in the 1980s, but thought it nonsense. In reality, I simply did not understand. By the time I stepped down as the chief executive of a publishing group, as well as editor of a journal, I recognized that the librarian was right in many ways. Many other academics and librarians think the same, which is why a major effort is underway to make all medical research available free to everybody everywhere. Sooner or later, I believe and have for some time, it will happen. When is much less clear.

PUBLISHING SCIENTIFIC RESEARCH IS HIGHLY PROFITABLE

Publishing scientific research is a highly profitable business—unsurprisingly because publishers are given the research, which is highly valuable, for free. Robert Maxwell—a notorious British business bully who fell off his yacht and drowned after robbing the pension fund of his employees—got rich not through publishing the *Daily Mirror* but through publishing science.

Reed-Elsevier, the world's largest publisher of scientific research, publishes over 1800 journals. In 2005 it made an adjusted operating profit of £1142m on a turnover of £5166m. The scientific part of the company contributed 39% of the profit (£449m) from 28% of the business (£1436). In other words, the scientific part of the company (which is predominantly medical) makes a large part of the profits and in some ways supports the non-scientific parts.

It is hard to come by the accounts of an individual journal, but I have seen many over the years. There are many comparatively minor journals that have an annual income of a million pounds. (I have never seen the accounts of the *New England Journal of Medicine*, but its annual income

will be tens of millions of dollars and probably close to \$100m.) The million pound journal might well have a gross margin (income minus direct costs like paper and printing) of £600 000. After subtracting the overheads the profit might well be £350 000. By no means all journals are so profitable, but this is a much more profitable enterprise than most.

WHO CREATES THE VALUE IN A PUBLISHED STUDY?

I want to illustrate why publishing research journals is so profitable by considering who does what and the value of their contribution. I should make clear that I am describing the classic research journal, which is comprised almost entirely of original research. Many of the world's 10 000–20 000 biomedical journals (nobody knows the true number) still take this form, although many are now adding other features, such as review articles.

Of all the value that resides in a journal the vast majority is in the research itself. Many randomized trials, for example, cost millions, even tens of millions of dollars, to conduct, but more than the cost it is a difficult undertaking. Comparatively few people have the skills and competence to undertake major trials. Patients of course must give their bodies, time, and commitment. They take risks, albeit with the chance of reward. They are not paid. Research ethics committees must examine and approve the research, again without financial reward. So the research paper that is submitted to a journal is very valuable. I have used the example of a randomized trial, but other kinds of research can be equally valuable.

When authors submit a paper to a journal they must usually agree both not to submit elsewhere and to transfer copyright (for no fee). Why, I often wonder, do authors agree to these requirements?

Once submitted to a journal the study will be registered. The process of registering a paper is not complex, and the administrative tasks associated with a journal can be carried out with comparatively little training. Publishers do pay such editorial assistants, but they pay them little—and one assistant might look after several journals. Increasingly these administrative processes are carried out on the web. There are costs in buying such

systems, but in the longer term there should be savings. Indeed, a free open source publishing system will soon be available. This means that any individual or organization might start a journal at a very low cost.

Next the study will be scrutinized by an editor. I am, of course, hopelessly biased, but I believe that good journals depend first on good editors—albeit that their main job is to assemble an excellent team to do the work. The work of editors may therefore be valuable, but as I am primarily concerned with the contribution of the publisher we do not need to be detained by an argument over the exact value of an editor—because in the classic research journal they are paid nothing. (Some, perhaps an increasing number of publishers, do pay editors, and certainly the editors of the journals published by the BMJ Publishing Group are paid.) They do it for the honour of the position and the good of the discipline. I have met many editors who labour long and hard over the journals and yet who receive no payment. Indeed, they forego income—because they could be spending the time doing something for which they are paid. They work weekends and nights for the good of the journal. Many of these naïve (and it is hard to avoid the word) academics have no idea that they are working for free for a journal that may be bringing the publisher a 60% gross profit. The academics are, of course, paid a salary by a university or similar institution. It might be that they do all their editorial work in their own time, but often they do not and cannot. This is an example of theft.

Yet many of these editors have unique knowledge and skills. Many also have famous names that bring lustre to the journal. Their ‘market value’ could be huge, but, luckily for publishers, academics have not thought in such terms (although now increasingly they do). The editors do, of course, get something important from being an editor. It is fun and gives a sense of being at the centre of a community. Editorship often brings academic credit, and so may bring promotion and financial rewards. These rewards come, however, from the academic community not the publishers. This might be described as the ‘secret ingredient’ of the publishers: they have so entangled themselves in the system of academic credit that it is hard for the academic world to ‘uncouple’ publishing from credit.

The editor then sends the paper out for peer review. To produce a good review of a study is time consuming and difficult. Almost by definition, only a few people are capable of the task. Yet peer reviewers are very rarely paid and are never paid the market rate. So the value injected by the reviewer, which could be considerable, is injected at no cost to the publisher. Reviewers don’t even get credit—because most peer review is still conducted anonymously.

If the study is accepted then it must be technically edited. This is a process that can add considerable value if well done; but publishers often pay for only the most

minimal editing—correction of the grossest errors. The technical editors are poorly paid, work from home, and are often expected to edit several papers in a day, obliging them to edit only lightly.

The publishers pay for the design of the journal, but it is usually minimal. They also pay for the typesetting, paper, printing, online hosting, and distribution. These comprise most of the direct costs, but they are all something that anybody could go out and buy. The publishers sell advertising space, but many research journals do not contain any advertising. The marketing and selling is also done by the publishers, but some of these journals are ‘must have’ journals with very small circulations. Almost all the copies go to academic libraries—and these libraries have had to buy them.

ACADEMICS ADD THE VALUE, PUBLISHERS MAKE THE PROFITS

Recognizing that some academic libraries cannot do without these journals, publishers have charged huge prices. *Brain Research* famously costs \$23 617 for 2006 a year, the price of a car. Furthermore, the publishers have for around 20 years been following a business model that I call ‘less for more’. Recognizing that libraries would cancel subscriptions—partly because of shrinking budgets and partly because of rising journal prices—publishers have put up prices by substantially more than the rate of inflation to compensate for the cancelled subscriptions. The *reductio ad absurdum* of this policy would be a single subscription at a vast price.

This business model was clearly unsustainable, and it created anger among librarians and the academic community, particularly in the USA. They were angry because the publishers were sucking money out of the academic community and adding little or no value.

MAKING PROFITS FROM RESTRICTING ACCESS TO KNOWLEDGE AND IDEAS

The fact that publishers make money by restricting access to information is unfortunate for the world economy—because trade in information and ideas is quite different from trade in physical objects. As George Bernard Shaw pointed out: ‘If you have an apple and I have an apple and if we exchange these apples then you and I will still each have one apple. But if you have an idea and I have an idea and we exchange these ideas, then each of us will have two ideas’. Ideas breed. The more people who have access to information and ideas the more ideas we will have—and ideas are a major source of wealth in the information age.

WHY HAVE ACADEMICS TOLERATED EXPLOITATION?

Why have academics tolerated exploitation? My answer is that the publishers are now being found out and challenged, as I will discuss below, but why hasn't it happened sooner? The first answer is that academic credit depends so much on publishing in particular journals. Academics need to publish in them in order to progress, and academic libraries have to have them. It would be a bold or foolish academic who declined to publish in the top journal because it was too expensive or owned by a rapacious publisher. I happened to be at Mill Hill, the main research centre of the Medical Research Council which may have Britain's greatest concentration of biomedical researchers, just after the initial announcement of Pubmed Central, the free database of research. We discussed the case for changing the publishing model. The reaction of the researchers was: 'There's much we don't like about the present set up, but we are nervous of change. We know how to play the present game well. If the game is changed we mightn't do so well'.

Perhaps the second answer to the question of why change has not happened sooner is that nobody has hurt quite enough. The academics did not have to pay for the journals themselves. The librarians had to pay but became increasingly clever at getting papers from journals they did not subscribe to themselves. And those running the whole academic and research system had much to think about apart from the excessive price of journals.

A third factor may have been that many academics were in some way associated with societies which were making generous profits from their journals and using them to underwrite the costs of the societies. Many academics also benefited personally from the largesse of the publishers. I went and spoke in Amsterdam at the editorial board meeting of a journal published but not owned by Reed-Elsevier. The board had all been flown from America, and the hospitality was spectacular. My cynical mind thought that the profits flowing to Reed-Elsevier would be even more spectacular.

THE UNETHICAL PRACTICES OF SOCIETY PUBLISHERS

Making money through restricting access to research is, I believe, ethically very questionable for academic societies. The British Society of Lumpology exists to raise standards in and promote lumpology and reduce the mortality and morbidity that results from lumps. Its journal, the *British Journal of Lumpology*, publishes much of the most important research in lumpology. Much of that research is funded with public money. The point of the research is to 'raise standards in and promote lumpology and reduce the

mortality and morbidity that results from lumps', exactly the mission of the British Society of Lumpology. So does restricting access to that research conflict with the mission of the society? To my mind, it clearly does.

The British Society of Lumpology responds to this ethical challenge first by refusing to see it. It publishes an excellent journal full of important information on lumpology. It has been doing so for years. When challenged the society says that the profits of the journal are important because they support the society and fund some research. The existence of the society might be threatened if the profits disappeared. (Many societies have become dependent on the profits from their publications.) My answer is that if the society and the research have value then other ways will be found to fund them. If they do not, then they should not be funded anyway. I worry too that some of the profits go on the dinners and ceremonies of which such societies are usually fond.

A NEW DAWN

Whatever the reason, the traditional business prospered for many years; but the arrival of the world wide web is changing everything. It opens up the possibility of authors communicating directly with readers without any intermediary. Publishers, librarians, peer reviewers, and editors could potentially all be swept away. They are all still there at the moment, but rather as in a balloon debate they may have to justify their existence.

We are still, I am sure, at the beginning of the electronic revolution—the 'paradigm shift' from the industrial to the information age and from a paper world to a paper and electronic world. Ten years ago almost no journals had electronic versions. Now virtually every journal does. We may think that that is a big change in a short time, but at the moment we are largely copying the old paper world in electronic media. The change to doing everything completely differently is just beginning, and it is hard to see the shape of the future. Thomas Kuhn who invented the idea of paradigm shifts says that those stuck in one paradigm cannot see the next. We are entering a phase of what the Austrian-American economist Joseph Schumpeter called 'creative destruction'. New technologies allow new ways of doing things but destroy the old at the same time.

We can, however, see drivers of change, and with the business of publishing money is one. Academics are fed up with being ripped off and are proposing different ways of making research available. A second driver is abhorrence of the Balkanization of medical research that I have described above. A third is the slowness of the paper world, but the fourth—and perhaps ultimately most powerful—driver is the power of a new vision. It has been expressed best by Stevan Harnad, a prophet of the digital age:

'It's easy to say what would be the ideal online resource for scholars and scientists: all papers in all fields, systematically interconnected, effortlessly accessible and rationally navigable, from any researcher's desk, worldwide for free.'

Ten years ago this would have seemed a fantasy, but the appearance of the web has made it achievable. Every word in this pithy quote is important for the vision, but it is the last two words—'for free'—that send a tremor through publishers. Harnad expresses the vision of what is called 'the open access movement': those who believe that research should be available for free and that people should be free to republish it with the only condition being that they credit the authors.

Just as the appearance of the world wide web has allowed Harnad's vision so it has allowed publishers to break out of the 'less for more' business model. The electronic world allows a very different business model because the marginal cost (the cost of supplying one more customer) is effectively zero, whereas in the paper world it costs about £60 to send somebody else a copy of the paper *BMJ*. Publishers are now linking together all their electronic copy and trying to persuade librarians to buy more material for more money. So if a library previously purchased 80% of your journals for £x it can now have electronic access to all your journals for £x plus perhaps 10%. So it's a 'more for more' model.

There are problems with this model. First, the librarians may not want the other 20% of your journals—particularly as the other 20% may be very poor quality (which is why they did not buy them in the first place). A second problem is that most librarians still have static or shrinking budgets. So if they spend more money on your collection of journals (the 'bundle' in publishers' jargon) then they will have to cancel other journals, and these are journals that they did want to buy. So big publishers may be pressurizing librarians into reducing the quality of their collection.

THE OPEN ACCESS MOVEMENT

Alternatives are now being created to traditional publishers and journals. The Public Library of Science has a vision very similar to that of Harnad, and it has some very powerful and clever supporters—including the Nobel Prize winner Harold Varmus, who was previously head of the National Institutes for Health. (Since I first wrote that sentence I have joined the board of the Public Library of Science, meaning that on average the organization is less clever than it was.) It wants all medical and scientific research to be available free on the web for everybody, and it has an embryonic model—Pubmed Central. Pubmed, the forerunner, is an electronic database of the titles and abstracts of

research articles produced by the National Library of Medicine in Washington, funded by the American tax payer, and used by hundreds of millions of people. (I often describe it as one of America's two great gifts to the world: the other is jazz.) Pubmed Central is an extension of Pubmed in that it has the full text of the research. It started with relatively few articles—because most publishers, including society publishers, refused to allow their material to be included. Most publishers do, however, allow their articles to be placed on Pubmed Central after a period of time (often a year), and so the repository of free material is beginning to grow. (It is also possible to find on the web a high proportion of material that is supposedly behind access controls.)

So the problem of the Public Library of Science is how to get from where we are now to where it wants to be. It first tried a boycott of journals that would not play ball. Researchers were invited to sign the following pledge:

'To encourage the publishers of our journals to support this endeavor, we pledge that, beginning in September, 2001, we will publish in, edit or review for, and personally subscribe to, only those scholarly and scientific journals that have agreed to grant unrestricted free distribution rights to any and all original research reports that they have published, through PubMed Central and similar online public resources, within 6 months of their initial publication date.'

Some 30 000 researchers from 180 countries signed this pledge, but it did not have much impact. Now the library is trying another tack. It has started its own journals. Importantly it also has what may prove a workable business model—'author pays'. It reverses the present model, whereby authors pay nothing (although they do actually have to pay page charges for some journals) and publishers get their money back through subscriptions, to a model where authors pay for peer review and their material being placed on the web but their material is then available free to everybody.

The idea that authors might pay to have their research published at first thought sounds like vanity publishing. But if you have had a grant of \$5m for your research why not take \$2500 of it to pay for peer review? Your research will then be available worldwide for free. An increasing number of research funders—including the Wellcome Foundation—are willing to pay these fees and, indeed, require their researchers to publish in open access journals. Furthermore, the model has already evolved so that your institution will pay. The National Health Service and the universities in Britain have done deals with Biomed Central—a commercial publisher that uses the author pays model and then provides open access—to allow all NHS funded research to be processed by Biomed Central and

made available free. Traditional publishers—like Oxford University Press and the *BMJ* Publishing Group—are also experimenting with the model.

There is potentially a substantial saving here for the academic community. It's been calculated by Andrew Odlyzko (with the calculation updated by Jan Velterop formerly of Biomed Central) that the academic community currently pays around \$5000 to be able to access a peer reviewed article—so a payment of \$2500 for everybody in the world to have access is a huge saving as well as an improvement in access.

The author pays model also has the potential to allow the power of the market to operate where it has not operated before. The model currently advocated is that authors pay for peer review and the posting of their article only if it is accepted. This seems to me to create an uncomfortable conflict of interest. Editors and publishers will be rewarded financially for accepting material. Another model might be that every author pays a little on submission, meaning that those who have their papers rejected in some ways support those who have their papers published. This might mean that inexperienced authors support experienced ones, a regressive measure. All of this is, of course, irrelevant if institutions simply pay a flat fee to have all papers submitted by their employees reviewed—although a snag with this model might be that publishers cut costs in order to make a profit.

To some extent this happens already. The *BMJ*—like other major journals—has around 6000 papers a year submitted. Yet it publishes only about 600. I used to tell our editors that we should invest our resources in the papers we were going to publish not in those we rejected. This means that we were quick and brutal with many of our rejections.

I can imagine a model in which authors have a choice in paying for various services. They might pay \$50 for a rapid rejection, \$150 for a detailed rejection with ideas on how to improve the study for submission elsewhere, \$250 for external review (more for more reviewers) with the journal passing on some of the money to the reviewers, and \$450 for a detailed report from the editorial committee. They could then choose whether to pay to have their paper technically edited, perhaps even with a choice over how extensively, and choose whether to pay for the journal to prepare a short version for the paper journal. Subsequently they might pay for press releases, media support, or even a dissemination and change programme—funders fund research to achieve change not just a publication in a journal.

INTRODUCING THE MARKET INTO THE DARK CORNERS OF THE SCIENTIFIC PUBLISHING PROCESS

The beauty of a properly functioning market is that resources will flow to where they add most value. I imagine too a hybrid model where authors pay for what matters to them and readers pay for what matters to them. So research papers—which matter more to authors than readers—might be paid for by authors and made available free to everybody, whereas material that editors produce—by writing themselves or commissioning—would be paid for by readers. This would mean that editors would have to make sure that they were meeting the needs of readers not indulging themselves.

At the moment the market functions poorly. Publishers make money from value they do not originate and by restricting access to ideas that will breed more ideas if shared. They make bigger profits by keeping their costs to a minimum and by pleasing authors not readers. By bundling their products they promote the importance of quantity not quality, and the anti-competitive nature of the market works against the smaller publishers, many of whom have the potential to perform best.

A move to a market where authors and readers pay for what they value should produce a much healthier market, but authors tend to react negatively when they first hear about the author pays model. Their first thought is that it is a move to 'vanity publishing'; but, importantly, authors pay not for publication but for peer review—and for publication only if the paper passes peer review. The next worry is that the poor will be disadvantaged. This is a legitimate worry, but publishers might want to make their services free to those from the poor world (as at the moment they make access free). Plus this problem would be avoided if institutions rather than individuals paid—just as it is mostly institutions rather than individuals who currently pay for subscriptions.

CONCLUSIONS

I feel that author pays and open access will be a workable model for the future, but immured in the old paradigm I may be wrong. I may also be wrong in thinking that the business of publishing research will change from something that seems to me almost unethical to something much more ethical where the whole world has access to research. I do not think here though that I will be wrong: the drivers for change are too strong. It will not be possible to resist them forever. More difficult than predicting the direction of change is the predicting the rate of change.