

## Elsevier's *Chaos, Solitons & Fractals*: Risen phoenix or missed opportunity?

As I [reported](#) on 16<sup>th</sup> March, after a period of quiescence the journal *Chaos, Solitons & Fractals* (CS&F) is back in business – complete with two new co-editors-in-chief, a brand new editorial board, refined aims and scope, and a new look. Former critics of the journal appear to have been appeased. But CS&F is only one of several [Elsevier](#) journals to have been attracted criticism in the past few years. In having as a result to constantly adopt fire-fighting mode has [Reed Elsevier](#) lost sight of the big picture? A recently published report by equity research firm [Bernstein Research](#), for instance, suggests that Elsevier is currently "in denial" about Open Access (OA), a growing movement that the report's author argues poses a significant threat to the company's future profitability. Ironically, were Elsevier to embrace OA, and more transparent publishing practices like [open peer review](#), it might avoid future controversies like the one to engulf CS&F, and succeed in warding off the threat to its profitability at the same time. Perhaps the re-launch of CS&F was a missed opportunity?

Those who have been following the story of the nonlinear science journal *Chaos, Solitons & Fractals* will recall that in November 2008 Elsevier announced that the founding editor of the journal – [M. S. El Naschie](#) – was [stepping down](#).

The announcement came at a time when El Naschie was being subjected to a barrage of [criticism](#), most notably in a series of critiques posted on the [n-Category Cafe](#) blog. The most significant of these were posted by a theoretical physicist at the [Ruđer Bošković Institute in Zagreb](#) called [Zoran Škoda](#), and [John Baez](#), an American mathematical physicist at the University of California, Riverside ([UCR](#)).

The controversy came to a head the day after the announcement of El Naschie's retirement, when [Nature](#) published an article containing a number of allegations about the editor.

The article appears to have become the subject of a libel action: In November last year *The Press Gazette* [reported](#) that El Naschie had begun proceedings in the English courts against *Nature*. As *The Press Gazette* put it, "According to a writ filed with the High Court by legal firm [Collyer Bristow](#), El Naschie claims the story alleges he used his editorial privilege to self-publish numerous papers he'd written, which would not have been published elsewhere as they were of poor quality and had received no peer review."

Currently we do not know the outcome of the libel action. When I emailed *Nature's* head of press Ruth Francis about the case in March she replied: "We have no update at present. I've got your email on record though and will let you know if that changes."

An email enquiry sent to El Naschie at the same time remains unanswered.

### Re-launched and renewed

Regardless of the noise surrounding CS&F, Elsevier clearly had to make a decision about the journal's future. It continued publishing the backlog of around 1,000 papers that had been accepted when El Naschie was editor but not yet published. However, with no new editor appointed, in June 2009 it announced that it was no longer accepting new submissions for the journal. It added that authors looking to publish in the journal might want to consider submitting their papers to an alternative Elsevier journal, leading some to [conclude](#) that CS&F was about to shut up shop.

When I spoke to Elsevier spokesperson Shira Tabachnikoff in November 2009, however, she refuted this. "Elsevier does not have the intention to stop the publication of the journal," she [said](#). "We are working on renewing the aims and scope, editorial structure and ensuring a transparent online submission system is in place."

Meanwhile the company continued publishing the paper backlog, including [further articles authored by El Naschie](#). While the final paper from the backlog went online last August, the last print version of CS&F was not published until December.

Then on 16<sup>th</sup> March 2010 – 16 months after El Naschie's retirement – the journal was re-launched. The reborn journal, announced Elsevier, will have not one but two new co-editors-in-chief – Professor [Maurice Courbage](#) of [Université Denis Diderot - Paris 7](#), and Professor [Paolo Grigolini](#) of the [University of North Texas](#).

"The entire editorial board has been renewed," I was told by Harald Boersma, who has replaced Tabachnikoff at Elsevier. Renewed here, we should note, [means](#) that practically the entire editorial board has been replaced. "Further updates are expected," added Boersma.

The journal's [re-worked web site](#) includes detailed information about CS&F's peer review policy, and one on "publication ethics". The latter includes the statement: "As per January, 2008 all Elsevier journals have become members of [COPE](#), the Committee on Publication Ethics. Elsevier's ethical guidelines and policy directives are described in the Publishing Ethics Resource Kit ([PERK](#)).

There is also a section on transparency that, in the context, one might feel slightly misses the target. "We are committed to the quality, efficiency, and transparency of the editorial process," it reads. "To substantiate this ambition, every year's final volume of *Chaos, Solitons & Fractals* will contain an overview of performance indicators, such as the total number of submitted papers and the rejection ratio."

And as Tabachnikoff promised, the aims and scope of CS&F have been renewed. "We chose to centre the journal around a few focus areas where we expect nonlinear science and complexity to lead to exciting and significant developments," Boersma told me. "This is reflected in the formulation of the aims and scope, which identifies a few key areas of interest i. e. complex networks and computational biology."

Or as the web site puts it, the aims and scope have been "[narrowed to strengthen the focus and identity of the journal](#)", which will now centre on the [interdisciplinary theme of complexity](#).

What does this mean in practice? "*Chaos, Solitons & Fractals* aims to be a leading journal in the interdisciplinary field of Nonlinear Science, and Nonequilibrium and Complex Phenomena," [explains](#) the web site. "It encourages the submission of articles on the following subjects in this field: dynamics; non-equilibrium processes in physics, chemistry and geophysics; complex matter and networks; mathematical models; computational biology; applications to quantum and mesoscopic phenomena; fluctuations and random processes; self-organisation; social phenomena; and engineering. Contributions on both fundamental and applied studies are welcome."

## Now impressed

In addition, says Boersma, the format of the journal will change, and will now consist primarily of "regular articles, letters and reviews, as well as 'Frontiers' papers,"

Frontiers papers are overviews that "highlight recent developments and outline future challenges", explains Boersma, with the aim of allowing "cutting-edge research to be published rapidly for a broader audience."

Finally, the journal has a new look that includes a different cover and two column formatting. Importantly, papers are once again being accepted – and can be submitted electronically [here](#).

Commenting on the re-launch, newly-appointed co-editor-in-chief Maurice Courbage said: "We are pleased to be joined by some excellent editorial board members, who will be instrumental in attracting leading authors in the field."

Courbage's own research interests are nonlinear science and complexity, including quantum and classical statistical mechanics, neurodynamics, ergodic theory and cellular automata.

His co-editor-in-chief Professor Grigolini is a member of the University of Texas' [Center for Nonlinear Science](#), where he works on quantum mechanics, statistical physics, complex networks and biological systems, in particular complexity in neurophysiological processes.<sup>1</sup>

Will El Naschie be associated with the re-launched journal, I asked Boersma. "El Naschie will continue to be listed as founding editor," he replied, but "will not play an active role in the renewed journal."

When I asked Boersma if we can we expect El Naschie to contribute further papers to the journal he replied obliquely: "All papers from all authors will be subject to the same review process."

So how do critics react to the re-launch of CS&F? When I contacted Baez he declined to comment.

Škoda however responded positively. "While Elsevier initially proved hesitant to do the appropriate thing – like stopping publishing the papers accepted during the El Naschie era – I am now impressed that they have replaced not only the main editor, but the whole editorial board with a new one."

He added: "I am not a specialist in the exact focus of the journal so I do not know most of the people. But a cursory look shows that the board has undergone a thorough replacement."

Concluded Škoda: "Hopefully, Elsevier will maintain close contact with the new board. I have heard complaints from members of Elsevier's journal boards that they have practically no contact with Elsevier employees. That is not a good general practice. But, as I say, I can see that Elsevier is now trying to improve this journal significantly and I believe it has a chance to become a much better journal all together."

What about former authors? Do they envisage continuing to publish in the journal? [Shawn Halayka](#), who describes himself as an "independent researcher" published [four papers](#) in CS&F under El Naschie's editorship. "I'm sure that some people will still doubt the quality of the journal, no matter who is on the editorial board," he replied, "But I don't see any reason not to submit fractal-related papers to CS&F in the future".

## The big picture

It would seem that the new editors-in-chief are well qualified to take on the management of CS&F and there is no reason to doubt that the re-launched journal will be anything but a good-quality peer-reviewed publication. But where does the El Naschie controversy fit into the larger Elsevier scene?

CS&F is not the only Elsevier publication to give the company a headache recently. In an [Australian court case](#) last year, for instance, it emerged that between 2000 and 2005 the company had published [six fake medical journals](#). And while these were sponsored by a large pharmaceutical company they were not acknowledged as being sponsored. Faced with growing public criticism, the CEO of Elsevier's Health Sciences Division Michael Hansen eventually made what amounted to a [public apology](#).<sup>2</sup>

And earlier this year [The Scientist](#) reported that, in the wake of the controversial publication (and later [withdrawal](#)) of two papers on AIDS, Elsevier plans to [introduce peer review](#) to one of its

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<sup>1</sup> Paul Grigolini is not new to CS&F. He appears to have [published](#) around 18 papers in the journal since 2001. He also authored a paper in a [book](#) published by Springer in 2005 for the [festschrift](#) in honour of El Naschie's 60<sup>th</sup> birthday. The paper is entitled *Quantum Mechanics and Non-Ordinary Statistical Mechanics*.

<sup>2</sup> One could argue that this was not strictly a peer review issue: Elsevier was quick to point out that the papers *were* peer reviewed (by other journals) but then compiled into a new publication — presumably for purposes of marketing by the pharmaceutical company concerned. The mistake, admits Elsevier, lay in calling the new publications journals. Nevertheless, this goes to the larger point about the danger of Elsevier being distracted by controversies over some of its publications.

journals that has not traditionally [reviewed](#) the papers it publishes. The journal – [Medical Hypotheses](#) – was founded to publish provocative articles rather than peer-reviewed papers.

"*Medical Hypotheses*", [explained](#) *The Scientist*, "has been in [hot water](#) since earlier this year, after AIDS researchers complained about an article it ran by AIDS denialist [Peter Duesberg](#)."

No doubt to Elsevier's frustration, its intervention appeared only to fan the flames. In a separate article *The Scientist* [reported](#): "Despite the uproar that the [Duesberg] article created, the editor-in-chief of [Medical Hypotheses](#) has received more than 150 letters of support for the journal's non-traditional publishing model, in which papers are chosen by the editor-in-chief, [Bruce Charlton](#)."<sup>3</sup>

Nevertheless Elsevier fired Bruce Charlton for refusing to introduce peer review to the journal.<sup>4</sup> And it is expected that that most of the 19-member editorial board will quit too. Is there a danger that in having to keep going into fire-fighting mode Elsevier could be losing sight of the big picture?

Certainly a report published in March by London-based equity research firm [Bernstein Research](#) would seem to support such a claim. The Report's author [Claudio Aspesi](#) argues: "Reed Elsevier seems in denial on the magnitude of the issue potentially affecting scientific publishing and we would welcome a more thoughtful approach to this issue."

Aspesi explained: "Other leading STM publishers are gearing up for Open Access, as a significant number of publishers (and academics) think that it will become a leading model of distribution in the next five to ten years. Investors' response to our previous research on the STM market suggests that the financial community largely discounts the threat of Open Access, and Reed Elsevier itself continues to argue that Open Access will never happen."

While this may have been an appropriate response in the past, Aspesi implied, it is no longer. His belief is that although OA was until recently "a solution in search of a problem", the current economic environment has turned it into "a potential solution to a real funding problem, since saving the average 25% operating profit margin captured by the publishers would help libraries at a time of massive funding cuts."

Aspesi's thesis is that in the wake of the 2008/09 financial crisis research institutions have been desperately casting around for ways to save money, and many have concluded that OA is the answer to their prayers.

Pointing out that publishing industry researchers [Outsell](#) estimate OA can reduce the costs of disseminating research by as much as 57%, Aspesi believes that OA is now inevitable, and will soon become a mainstream form of publishing. While this will have significant financial implications for scholarly publishers, he concludes, Elsevier appears to be insensible to the gravity of the situation.

We should note that Aspesi seems to be unaware that, so far as scholarly communication is concerned, the financial problems confronting research institutions are far from new. The so-called "[serials crisis](#)" – the phenomenon where journal prices constantly increase at a higher rate than the consumer price index ([CPI](#)), forcing research libraries to cancel more and more journals each year – has had research libraries in its grip for several decades now.

## Green or Gold?

We should also note that Aspesi expects the savings to be realised by wide scale adoption of what is commonly called OA publishing, or [Gold OA](#). Although authors opting for Gold OA are required to

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<sup>3</sup> On 16<sup>th</sup> April *ScienceInsider* [reported](#) that Duesberg is now the subject of a [misconduct investigation](#) by the [University of California, Berkeley](#). The investigation, added *ScienceInsider*, apparently stems from complaints the university received after his paper in *Medical Hypotheses* was published.

<sup>4</sup> On his blog on May 11<sup>th</sup> Charlton [commented](#): "Aside from a few issues still in the pipeline, the real *Medical Hypotheses* is now dead: killed by Elsevier 11 May 2010. RIP."

pay the publisher an article processing charge (APC), Aspesi evidently assumes that the APC model will prove cheaper than the traditional subscription model.

Another way of making research OA, of course, is by [self-archiving](#), or [Green OA](#). With Green OA authors continue to publish in subscription journals but make copies of their papers freely available on the Internet – by posting them in online repositories. The physics community has been doing this since the creation of the physics pre-print service [arXiv](#) in 1991, although generally their papers are posted before rather than after publication, and today researchers are just as likely to post their papers in an [institutional repository](#) as in a subject-based repository like arXiv or [PubMed Central](#).

Aspesi's thesis raises two interesting and related questions about OA. First, can we indeed assume that the main growth will come from Gold OA rather than from self-archiving? If not, what are the consequences? Second, will Gold OA really prove cheaper than traditional subscription publishing?

To consider the first question: Gold OA does appear to be growing<sup>5</sup>. However, right now Green OA has more traction – not least because research institutions and funders are increasingly [imposing mandates](#) on their researchers requiring them to make their papers freely available on the Internet. Importantly, the Obama Administration [seems to be intent](#) on introducing a "Public Access Policy" similar to the one pioneered by the US National Institutes of Health (NIH). This is expected to see most or all publicly-funded research in the US made freely available on the Internet.

Additionally, on April 15<sup>th</sup> the Federal Research Public Access Act of 2010 (FRPAA) was [revived](#) and introduced into the US House of Representatives. If passed, the Bill will require federal agencies like the Department of Agriculture, the Department of Defense, the Department of Education, the Department of Health and Human Services, and the National Science Foundation to provide the public with online access to research manuscripts stemming from funded research no later than six months after publication in a peer-reviewed journal.<sup>6</sup>

True, we can assume both Green and Gold OA would meet the requirements of any mandate or public access legislation, but Green OA has one very significant advantage, certainly in the short-term: it does not require the payment of an APC.

With Green OA the research community continues to pay journal subscriptions, but authors also self-archive their papers. The aim is to ensure that researchers based at institutions without a subscription to any particular journal can nevertheless obtain copies of the papers published in it. 63% of publishers [surveyed](#) formally allow some form of self-archiving, although often only after an embargo period. [Elsevier](#), for instance, insists that researchers do not self-archive their papers until 12 months after publication.

What are the implications if Green OA grows more rapidly than Gold OA? We can expect that at some point research institutions will start cancelling journal subscriptions, on the assumption that their faculty are now able to obtain a free copy of most or all of the papers they need. Cancellation seems all the more likely given that current legislative initiatives like the FRPAA aim to reduce the embargo period from twelve to six months.<sup>7</sup>

What about our second question: Will Gold OA prove a cheaper way of disseminating research than the traditional subscription model? That certainly was the promise made by OA publishers in the

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<sup>5</sup> The extent to which Gold OA is growing [turns out](#) to be a less than straightforward issue.

<sup>6</sup> Commenting on the respective merits of the Obama initiative versus the FRPAA, OA advocate [Peter Suber](#) says: "The Obama policies could cover much the same territory as FRPAA, depending on what the public comments recommend and how the administration decides to interpret them and act. The policies could fall short of FRPAA or surpass it. But at best they still won't make FRPAA moot. The main reason is that Obama could only implement OA mandates by executive order, which could be reversed by the next president. We'd still want legislation to make the policies permanent."

<sup>7</sup> It is possible, of course, that if Green OA starts to accelerate subscription publishers will withdraw permission for authors to self-archive. However, in an environment in which mandates are increasingly being imposed, and public access legislation introduced, it is highly unlikely that they would be able to enforce such a sanction.

early days. In reality, however, APC prices have risen continuously, and now pose the same inflationary conundrum that lies at the heart of the serials crisis.

For this reason, many researchers are now sceptical that Gold OA will lower costs. [Keith Jeffery](#), Director IT and International Strategy for the Science and Technology Facilities Council at the Rutherford Appleton Laboratory ([RAL](#)) is one of the sceptics. Calculations done at RAL a few years ago, he says, indicated that Gold OA will prove not less, but more expensive – certainly for research-intensive institutions.

For this reason, he suggests, a better option for the research community is to continue paying subscriptions but impose a Green OA mandate on researchers. "By adopting Green rather than Gold OA it is possible to get all the benefits of Gold while paying three to four times less."

With more and more research institutions, funders and governments reaching a similar conclusion, Green OA looks set to grow rapidly. Since at some point this can be expected to lead to journal cancellations it has financial implications for scholarly publishers. So while Aspesi is right to conclude that Elsevier's business model is under threat, the threat comes from Green rather than Gold OA.

How great is the threat? Aspesi predicts that in the near term underlying revenue growth for Elsevier will "decline from the 5 to 6% range seen in the past five years to a more modest 1 to 2% in the next five/six years."

However, if the main threat comes from Green rather than Gold OA the implications for subscription publishers like Elsevier are presumably somewhat greater.<sup>8</sup>

## No charge and no barriers

As we have seen, OA looks set to grow rapidly. Yet in re-launching CS&F as a subscription journal Elsevier has signalled its continuing commitment to what many now view as yesterday's publishing model.

Had Elsevier re-invented CS&F as an OA journal instead it could have dipped its toes into the emerging new publishing environment, while at the same time addressing the peer review issue that lay at the heart of the controversy that overwhelmed the journal. After all, what better way of experimenting with OA than by trialling it with a journal that has (rightly or wrongly) been criticised for inadequate peer review?

What relevance does OA have to peer review? Its relevance lies in its greater transparency. As a contributor called [hilf commented](#) on the *Press Gazette* story about El Naschie's libel action, since OA [implies](#) making a copy of a paper available online "at no charge and no barriers" it ensures that "all colleagues and experts can discuss the paper – all but one will be not the author."

In other words, when making their journals electronic traditional subscription publishers inevitably lock their papers behind a paywall. This means that the number of researchers able to access them is restricted to those based at institutions with a subscription to the journal in question.

To provide their faculty with access to the papers published in CS&F today, for instance, a research institution would need to pay an annual subscription of \$4,701 (up from \$4,520 under El Naschie's editorship). Clearly not all institutions will want to use some of their increasingly-stretched serials budget to do that. And as the serials crisis worsens, so the number of institutions willing or able to subscribe to CS&F will surely fall year on year.

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<sup>8</sup> We should perhaps stress that the subscription-cancellation scenario is speculation. OA advocates have frequently [pointed out](#) that despite 19 years of physics preprint archiving there is no evidence that physics journals have been unduly impacted. At the same time, however, they acknowledge that the physics community may not be typical. Publishers, on the other hand, have consistently argued that self-archiving will impact their revenues, and for that reason they have [lobbied vigorously against mandates](#). Common sense suggests that publishers are right to fear the financial implications of mandates.



It would clearly be helpful if the readership of scholarly journals were maximised. It would make it easier for the research community (and other interested parties) to monitor the quality of those journals (and thus the quality of their peer review process), which in turn could be expected to encourage editors to place greater stress on quality.<sup>9</sup>

Fortunately, the Internet can help. If journals made all their papers freely available on the Web anyone would be able to read them and make a judgement. What better way for the research community to monitor the quality of today's [24,000](#) peer-reviewed journals than to make them all OA?

To do it justice, in re-launching CS&F Elsevier has committed to greater transparency. As the journal's web site [puts it](#), "We are happy to report that online submission using the Elsevier Editorial System (EES) is now available for *Chaos, Solitons & Fractals* ... This system facilitates communication among editors, reviewers, and authors, and ensures a rapid and transparent editorial process."

But while EES may make the review process more transparent to the journal's authors, editors and the publisher, so far as the rest of the research community is concerned, or indeed the public at large, there is no additional transparency.

Given recent (and growing) public suspicion about the effectiveness of peer review (e.g. [here](#), [here](#) and [here](#)) greater transparency is essential if the public is not to lose faith in science — as appears to have happened last November when emails from the Climate Research Unit (CRU) at the UK's University of East Anglia (UEA) were [leaked on the Web](#).<sup>10</sup> A [BBC Poll](#) in February, for instance, found that between November 2009 and February 2010 the number of respondents who believe that climate change is real fell from 83% to 75%.<sup>11</sup>

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<sup>9</sup> We should not necessarily view this as exclusively an issue of scientist vs. layperson, but one of who has the necessary specialised knowledge to make a judgement. As the Internet sees the boundary between scientist and informed citizen begin to break down terms like "nerd scientist" and "[citizen scientist](#)" are emerging. It is possible that some parts of the scientific endeavour could come to more closely resemble the situation before the creation of the [Royal Society](#) in 1660. After all, at the start of the scientific revolution in the 16<sup>th</sup> and 17<sup>th</sup> Century there was no training in science as such, and ordinary citizens rubbed shoulders with "professionals". Indeed the term scientist was [not coined](#) until the 19<sup>th</sup> Century.

<sup>10</sup> Critics alleged leaked emails showed that [Phil Jones](#), head of the CRU had [pledged to exclude papers](#) from the Intergovernmental Panel on Climate Change (IPCC) report "even if we have to redefine what the peer-reviewed literature is." They also pointed out that the Panel's last report claimed that Himalayan glaciers were likely to melt entirely by 2035 — a prediction deemed sufficiently [erroneous](#) as to cast doubt on the quality of the peer review process the report had been subjected to.

<sup>11</sup> In fact, a cross-party committee of MPs subsequently "[largely exonerated](#)" Phil Jones who, they concluded, had not deliberately withheld or manipulated data in order to support the idea that global warming was real, and influenced by human activity; or that he had subverted the peer review process. The committee did however criticise the University of East Anglia for fostering a culture of non-disclosure of scientific information to climate sceptics, and for refusing to disclose information from within the CRU in response to Freedom of Information (Fol) requests. Chair of the House of Commons Science and Technology Select Committee [Phil Willis](#) said: "We have suggested that the community consider becoming more transparent by publishing raw data and detailed methodologies." Proposals like this for "[open data](#)" are now part and parcel of the wider movement for greater openness in science, of which OA and open peer review are component parts. Indeed a [later enquiry](#) into the CRU incident commissioned by the University of East Anglia itself, and led by [Lord Oxburgh](#), concluded, "[W]e observed that there were important and unresolved questions that related to the availability of environmental data sets. It was pointed out that since UK government adopted a policy that resulted in charging for access to data sets collected by government agencies, other countries have followed suit impeding the flow of processed and raw data to and between researchers. This is unfortunate and seems inconsistent with policies of open access to data promoted elsewhere in government."

Had Elsevier launched CS&F as an OA journal, therefore, it could have addressed the issue of transparency much more effectively, and signalled that it was prepared to embrace an important new publishing model at the same time.

Presumably Elsevier believes that EES provides sufficient transparency. In effect it is saying: "We plan to utilise a transparent electronic publishing system. This will enable us to monitor the review process. Neither the wider research community nor the public will be able to see what's going on, but trust us: We will ensure that all the papers we publish are properly reviewed."

Coming at a time when the public is still digesting the news that Elsevier oversaw the production of six fake journals, however, this is surely insufficient. We have reached the point where it is necessary for publishers to *demonstrate* that due process has taken place – by opening up peer review to the public gaze.

## Open peer review

If that level of transparency is needed, however, we have to conclude that OA will not be enough on its own. While making a journal freely available online allows anyone to assess the quality of the papers it has published *after* publication, it still does not demonstrate that those papers have been properly reviewed.<sup>12</sup>

That OA is insufficient is evidenced by the number of OA publishers that have also been accused of poor quality peer review (e.g. [here](#), [here](#) and [here](#)). Indeed, since Gold OA requires authors to pay to publish the danger of standards slipping is much higher than with a subscription journal. OA publishers inevitably realise that if they lower the quality bar they will be able to increase their revenues.

Fortunately the Internet again offers a solution. Scholarly publishers can introduce some form of [open peer review](#).

What is open peer review? It comes in a variety of forms, but at its best it is a review process sufficiently transparent that both the research community and the public at large can be certain a) that every paper published has been reviewed; b) who did the reviewing, or at least their qualifications for doing it; c) what reviewers recommended should be done to the paper prior to publication (and whether additional experiments were asked for); and d) whether those recommendations were acted on before publication.

The fact is that the increasingly complex nature of the research process, the revolution in scholarly communication sparked by the Internet, and the growing number of peer review scandals in recent years has made greater transparency essential.<sup>13</sup>

Writing in a recent issue of *Liber Quarterly* the Max Planck Institute's [Ulrich Pöschl](#)<sup>14</sup> put it this way: "The traditional forms of scientific publishing and peer review do not live up to the demands of efficient communication and quality assurance in today's highly diverse and rapidly evolving world of science. They need to be advanced by interactive and transparent forms of review, publication and discussion that are open to the scientific community and to the public."<sup>15</sup>

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<sup>12</sup> Again, one could argue that the Australian controversy was not a peer review issue. But Elsevier did call these publications journals, even though they contained no original peer reviewed research. Importantly, if the peer review process were more transparent, and all scholarly papers made freely available on the Internet, such sleights of hand would be detected very quickly, and so would be far less likely to occur in the first place.

<sup>13</sup> This is an important point: the need to update peer review processes is not an issue specific to Elsevier; it is an issue for all scholarly publishers, and for the research community at large.

<sup>14</sup> Pöschl is the founder and chief executive editor of the OA journal *Atmospheric Chemistry and Physics* ([ACP](#)).

<sup>15</sup> Pöschl also uses the term "public peer review". This nicely gets across the need for both the process *and* the end result of scientific communication to be more visible to those outside the scientific community. It is the public after all that funds most of the research published in scholarly journals, so the public should be able to



Some (e.g. [Kent Anderson](#)) [argue](#) that all that is needed is for publishers to, as Anderson puts it, "provide an ingredients list" for all published papers. This would list exactly what peer review took place, but unless the review process was visible to all we would still have to take on trust that what is written on the tin accurately describes the contents. Our argument is that this is no longer sufficient.

In 2007 freelance medical editor [Matt Hodgkinson](#) [put the case](#) for open peer review in this way: "[I]f there is doubt in the integrity of peer review (and there is more and more doubt), this increases the imperative for exposing pre-publication review processes. Journals can't just be paternalistic or secretive about peer review, and readers shouldn't take it on trust that an article labelled as 'peer reviewed' has been rigorously critiqued by experts in the field."

In short, publishers need to open up the entire review process so that everyone can see exactly what happened to each paper prior to publication, and who was involved in the decision making. Only in this way can the world be confident that due process has taken place.

Does OA imply the use of open peer review? No. In fact, some OA publishers are worryingly secretive about their review process. Nevertheless, given their greater general commitment to transparency, more OA journals currently practise some form of open peer review than do subscription journals. This includes journals published by BioMed Central ([BMC](#)) – e.g. [here](#), as well as journals like *Atmospheric Chemistry and Physics* ([ACP](#)) – e.g. [here](#).<sup>16</sup>

BMC's [Biology Direct](#) uses what Hodgkinson calls "open and permissive peer review". Articles are published if the author is able to solicit favourable reviews from at least three members of the journal reviewing board. These [comments](#) are then included at the end of the article – unless the author withdraws the manuscript. Additionally, comments can be posted by readers. And while it does not require it, [PLOS ONE](#) is also [keen](#) for reviewers to make their comments public.

In addition, PLOS ONE invites readers to [comment, make notes, and rate articles](#) – suggesting that in the future peer review will be both more transparent, and more inclusive. Not only will the entire peer review process be visible to the world, but readers will be invited to contribute to the review process. This reminds us of something the [open source movement](#) discovered some years ago: making computer code freely available online, and inviting other coders to test it, and contribute improvements, significantly improves the quality of the software built on that code – a phenomenon that open source advocate [Eric Raymond](#) expressed in the phrase, "given enough eyeballs, all [bugs](#) are shallow" ([Linus' Law](#)).<sup>17</sup>

But open peer review is not the preserve of OA journals alone. In fact, while most traditional subscription publishers remain deeply suspicious about OA (primarily because they fear its financial implications) they are becoming more sympathetic to open peer review.

In fact, after conducting a [randomised controlled trial](#) comparing signed with unsigned reviews (in which it was found that naming reviewers made no significant difference to the reviews written) [BMJ](#) [embraced](#) open peer review over a decade ago.

And despite oft-repeated claims that scientists would refuse to review papers if they could not do so anonymously, BMJ has found little evidence that this is really a problem. [Speaking](#) recently to [The Times](#) science editor Mark Henderson (in a BMJ article) BMJ's editor-in-chief [Fiona Godlee](#) said: "[W]e have had one or two reviewers saying they won't review for us, but the vast majority of reviewers are fine with it. And authors like it."

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see exactly how its money is being spent. And as more "citizen scientists" emerge we can assume that the public will want to take part too.

<sup>16</sup> ACP practices what Hodgkinson refers to as a form of "community peer review". As he puts it: "The editors refuse articles that don't meet minimal scientific standards, then post the remaining articles for 8 weeks of Interactive Public Discussion (named or anonymous), then publish the final version."

<sup>17</sup> [Linus Torvalds](#) is the creator of Linux, the kernel at the heart of the [free](#) operating system [GNU/Linux](#).

After undertaking a second randomised trial, BMJ now plans to go one step further: In the future it will attach the signed reviews to the papers when they are published, [reports](#) Henderson.

Like OA, open peer review now looks inevitable. After all, even if a few reviewers did prove reluctant to be named, their reports could nevertheless be published alongside the paper anonymously. As director of the [Wellcome Trust](#), [Mark Walport points out](#), this in itself is an improvement over traditional opaque reviewing. "If you publish a package of supplementary material, including anonymous reviews, it provides a paper trail and another level of accountability," he told Henderson, adding: "It would place pressure on reviewers to be scrupulously fair, because anything openly hostile or ridiculous would be out there, and on journal editors to think very carefully about their comments."

And this is the intermediate position adopted by the journal of the [European Molecular Biology Organisation](#) (published by *Nature*).

Unsurprisingly perhaps, *Nature* too is now considering publishing anonymous referees' [reports](#). As the editor [Philip Campbell puts it](#), "We've been thinking about that for a few years. There are questions we need to be careful about, such as does this change the relationship between the editor and the referee, but it is absolutely something we are looking at."

It is worth pointing out that open peer review offers more than transparency alone. As [salaamarifat pointed out](#) on [Open & Shut](#), in addition to enabling third parties to challenge the way in which a paper has been reviewed, it could be a valuable educational tool, demonstrating to younger researchers, for instance, how "the process of drafts, reviews, author replies, revision to publication" takes place. In other words, it could help train new scientists in how to write a good paper, and show them what proper peer review involves.<sup>18</sup>

## Fundamental tensions

But while other publishers are busy experimenting with greater openness, Elsevier seems determined to [stick to its knitting](#).<sup>19</sup> This is a pity: Elsevier is the largest scholarly publisher in the world and, arguably, has the strongest brand – despite occasional hiccups.

If Elsevier were to embrace a more open approach it would help dispel current doubts about the viability and desirability of both OA publishing and open peer review. Many researchers, for instance, still assume that – as a matter of course – OA journals don't peer review papers. Likewise despite BMJ's experience, there remains a widespread belief that if asked to sign reviews scientists would vote with their feet.

Importantly, as a veteran publisher Elsevier has a great deal of experience and expertise in managing peer review – again, despite occasional hiccups. Some start-up OA journals, by contrast, appear dangerously ignorant, or simply unconcerned, about the need to have a rigorous peer review process.<sup>20</sup>

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<sup>18</sup> Who does currently train researchers how to do peer review? Judging by some of the referee reports I have seen there is very significant room for improvement!

<sup>19</sup> True, Elsevier does now offer a [Hybrid OA](#) option. But this is available for only 40 of its 2,000 journals and (presumably to mask the fact that it was an OA initiative) was given the unfortunate name [Sponsored Articles](#) (implying some kind of corporation sponsorship arrangement). In a [2007 paper](#) Elsevier's David Clark argued that while there is some scepticism amongst younger researchers about peer review there is nevertheless, "stability in the underlying fundamentals of the scholarly journal publishing model." He added that "current open peer review experiments get hardly any traction". And of Open Access he said, "There is a diverse movement of people urging policy makers and others to embrace Open Access but, as yet, this model has not proven its sustainability." I am not aware of any evidence that Clark has changed his views since then.

<sup>20</sup> And let's face it, if publishers don't rigorously review the papers they publish then in today's networked environment researchers might just as well dispense with journals all together and simply post their papers on the Web themselves. In fact, many believe that journals will fade away over time. Be that as it may, if publishers are charging the research community to publish papers (be it via subscriptions or APCs) on the

As OA advocate [Stevan Harnad](#) has [pointed out](#), "What seems clear is that the conversion of established journals to OA, along with their track-records for quality control and ethics, is far preferable to new OA journal start-ups when what is missing and urgently needed today is more OA to the contents of existing journals, not more journal start-ups."

One might of course fairly ask: Why on earth would Elsevier want to support OA if it believes this new form of publishing poses a threat to its business? The answer is straightforward: it is by no means clear that Gold OA does pose a threat to subscription publishers; rather the evidence suggests that OA publishing will prove even more lucrative than subscription publishing. More importantly, if Elsevier continues to spurn Gold OA the threat from Green OA will be that much greater.

Where is the evidence that OA publishing is more lucrative than subscription publishing? We mentioned RAL's calculations, but consider also the recent [report](#) from the UK-based [JISC](#). This estimates that with an APC of \$1,500 (the average cost for Gold OA today) the UK's top universities would pay over £1.8 million (\$2.7m) more each year if they migrated from their current subscription arrangement with publishers to Gold OA. With an APC of \$3,000 (which several publishers now charge), the additional cost would rise to £5 million (\$7.5m).

While not all universities would necessarily pay more with Gold OA, we can be confident that any extra revenue generated will end up in publishers' bottom lines.

In short, JISC's figures confirm Jeffery's belief that OA publishers have not only successfully [cloned](#) the high margin model customary to scholarly publishing, but increased profitability in the process. Subscription publishers, therefore appear to have nothing to fear from Gold OA but fear itself.

If, however, subscription publishers continue to sit on their hands while OA mandates are introduced, and public access legislation passed, they can expect to see their revenues fall substantially.

Publishers, of course, realised several years ago that Green OA poses a threat to them. For this reason they began offering so-called [Hybrid OA](#). Hybrid OA allows researchers publishing in a subscription journal to opt for OA on a per-article basis, by agreeing to pay an APC. Publishers argued that Hybrid OA would allow them to make a smooth transition to OA. But Hybrid OA is voluntary;<sup>21</sup> and as evidence has emerged that some publishers view it as little more than an opportunity to increase their revenues by [double dipping](#) (charging APCs on top of subscriptions), take-up has been minimal.<sup>22</sup>

What do we learn from all this?

A useful way of viewing the current situation is as [a horse race between Green and Gold OA](#). If Gold wins the race, publishers will succeed in porting their current profit levels to the new publishing environment, and the serials crisis will have been replaced by APC inflation, along with what Harnad calls [the OA Gold Rush](#).<sup>23</sup> If Green wins, the cost of scholarly communication will fall, and the serials crisis will go away, or at least be ameliorated, as the subscription burden on research libraries eases.

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understanding that the charge includes the cost of doing peer review then they are taking money under false pretences if they fail to do that properly.

<sup>21</sup> With Hybrid OA the researcher has a choice: pay, say, \$3,000 to publish your article and know the publisher will make it freely available, or pay nothing and self-archive it yourself 6 or 12 months after publication. If offered such a choice what would you do?

<sup>22</sup> [Commenting](#) on Springer's hybrid option [Open Choice](#) (which costs \$3,000 per paper) last December, Springer CEO (and former Elsevier executive) [Derk Haank](#) commented: "Five years ago when we launched it, I said there would not be more than 5% take-up for this model. Five years later, we have seen only 2% take-up amongst all articles published by Springer."

<sup>23</sup> In the latest development of the OA Gold Rush comes [news](#) that one OA publisher has applied for a [business method patent](#) on a "system for peer reviewing and publishing scientific papers online."

From the perspective of the taxpayer (who funds most of the research published in scholarly journals, and then pays for it to be published, either through subscriptions or APCs) it would of course be far better for the Green horse to win the race. Green OA incurs no additional costs for research institutions beyond the subscriptions they are already paying; and as self-archiving grows it will be possible to progressively cancel those subscriptions. The only option publishers would have in such circumstances would be to progressively scale back their activities in line with the decline in their revenues. Certainly we can expect their 25% profit margin to evaporate pretty rapidly.

And there you have the fundamental tension between the public interest and private interests that lies at the heart of the crisis in scholarly communication. Green OA is the only way in which the scientific community can hope to control what many now believe to be the excessive profits that commercial publishers make from scholarly publishing, and so ease the budgetary crisis afflicting research libraries.

Gold OA, by contrast, offers publishers the promise of being able to continue enjoying the profitability that they have become accustomed to.

We should add that Green OA could eventually be expected to trigger something more dramatic than a fall in profitability alone. Like many OA advocates, Jeffery is confident that Green OA will triumph. And once it does, he predicts, commercial publishers are likely to become redundant. "I predict that the publishers' business model will break down and the new (Web 2.0-based) peer-review models will kick in with or without moderation by Learned Societies."<sup>24</sup>

## In denial

If that is correct, Elsevier has two options: It can continue to sit on its hands and wait for the inevitable decline in its revenues that Green OA will lead to; or it can embrace Gold OA and hope to lock its current price levels into the new publishing environment — as OA publishers have apparently succeeded in doing.<sup>25</sup>

Importantly, if it acted quickly Elsevier might be able to trip up the Green horse. As Jeffery points out, "The problem will occur for research institutions as publishers go progressively to Gold-OA only publications (i.e. no subscription-based whether paper or online)."

Suppose therefore that subscription publishers pre-empted events and took the initiative? And who better to do lead the way than Elsevier — the largest scholarly publisher in the world. If Elsevier were to suddenly convert all 2,000 of its scholarly journals to Gold its competitors would surely rush to follow suit. And if subscription publishers converted to Gold OA *en masse* they could be expected to bring the Green horse down.

Why? Because in such a scenario researchers would have no choice but to pay to publish. And they would have to pay the publisher's asking price. At that point Green OA would become moot. Why bother self-archiving if you have to pay to publish, and publishers now make your paper freely available on the web for you?

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<sup>24</sup> Many commentators have come to believe that in an electronic environment the only role left to publishers is that of managing the peer review. And as we suggested on Page 9 some believe that even peer review in its current form is set to change dramatically. This would perhaps be all the more likely if citizen scientists begin to play a greater role in science. As [Victoria Stodden](#) points out in a recent [paper](#) in the [Journal of Science Communication](#), "Contributions from citizen-scientists put pressure on the very definition of scientific paper and thus on the practice of peer-review." One could argue that CS&F author Shawn Halayka is a citizen scientist.

<sup>25</sup> Scholarly publishers are generally able to dictate what they charge the research community because they do not operate in a proper market. As anti-trust economist Mark McCabe [pointed out](#) to me in 2002, the scholarly journal market is "is a true market failure".

In turning up its nose at Gold OA, therefore, Elsevier may not only be conspiring in the erosion of its own business, but looking a gift horse in the mouth. As we said, Gold OA holds out the promise of enabling publishers to migrate their current profit levels to the new environment. Moreover, once they had locked their prices in they would be able to sit back and watch their profits grow as the print versions of most journals are phased out – the inevitable end point of the current migration of scholarly communication to the electronic domain.

But what if Aspesi is correct when he says that the current financial environment is sufficiently dire that the money available to pay publishers is set to decline dramatically no matter what? It is a fair point: While the serials crisis has been with us for decades it is not unreasonable to assume that at some stage the research community will simply be unable to continue funding scholarly communication, in whatever form.

At that point Jeffery's prediction may perforce come true: Web 2.0 technologies will come into play, and most of the scholarly communication process will be managed by researchers themselves, possibly with the assistance of learned societies.

Even if that were to prove the case, however, choosing between sitting on your hands and waiting for your business to fade away, or trying to protect as much of your income as possible seems like a no brainer.

We should also note that in February Reed Elsevier [announced higher than expected](#) pre-tax profits for 2009 of £1,279 million. Might this not suggest that Elsevier is right to stick to its knitting?<sup>26</sup> The problem is that those figures tell us about the past, not the future; although they do perhaps suggest that library serials budgets are more resilient than Aspesi assumes.

All in all, Aspesi's conclusion is probably fair enough: "While the final outcome is clearly still in doubt and the time frame for major change may appear very long, we think that 'noise' about alternative forms of dissemination will increase in the next years, revenue growth for a traditional science publishers will decline visibly because of budget constraints and the controversy around the prospects for Elsevier intensify."

The point is that, whatever the specifics, Elsevier can no longer afford to ignore OA, and the glitter of gold.

Back to CS&F: Many commentators felt that Elsevier should have shuttered the journal. But Elsevier recruited new editors and a new editorial board, and has re-launched CS&F as a subscription journal. While critics appear to have been silenced, it is hard not to conclude that Elsevier would have been far better to launch CS&F as an OA journal, and introduce some form of open peer review.

Doing so would have allowed it to dip its toes into the new publishing environment, while at the same time demonstrating a much greater commitment to transparency than it has done. As we have suggested, transparency and openness are the best defence against allegations of inadequate peer review.

The re-launch of CS&F, therefore, looks less like the rising of a phoenix, more like a missed opportunity.

However, we need to add that for Elsevier CS&F is just one journal in 2,000, and experimenting with a single journal at this stage might be described as doing too little, too late. Nevertheless, the take-home point from the CS&F controversy surely lies not in the details of who accused whom of this, or who sued whom over that, but how Elsevier responded to the controversy, and what that response tells us about the company's attitude to the open revolution now sweeping through scholarly communication.

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<sup>26</sup> The company described the results a "robust financial performance in unprecedented global recession".

And it is hard not to conclude that the company has chosen to hunker down and hope that the revolution burns itself out before it does too much damage, rather than seize the opportunities thrown up by the revolution. For that reason Aspesi is probably right to argue that Reed Elsevier is in denial.

Of course, if our analysis is correct, Elsevier's inaction could turn out to be good news for the taxpayer!

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