The OA Interviews: Michaël Bon, Founder of the Self-Journal of Science

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30th May 2016

"The OA movement has been fighting the wrong battle (all be it for a just cause), and for so long as it carries on doing so it will continue diverting and exhausting scientists and institutions in a fool's game in which they have little power."

To go direct to the Q&A with Bon click here

I recently argued that the open access movement faces a watershed moment. With green OA increasingly looking like a failed strategy, and a growing clamour to accelerate the transition to open access by persuading publishers to "flip" their subscription journals to OA (see also this) we are surely approaching an inflection point.

The problem here is that the OA movement looks set to take a wrong turn, and in doing so allow the so-called Publishing Oligopoly (the top five for-profit scholarly publishers) to increase its dominance of scholarly communication. And this will impact negatively on the research community. OA advocates might disagree with me, but I am not the only one to reach this conclusion. The danger was highlighted recently by UNESCO for instance.

What negative impacts are we talking about? First, it will mean that research institutions will have little choice but to continue paying excessive fees for the services that scholarly publishers provide. So, for instance, while a flip strategy would see a sharp uptick in the amount of research made freely available it would fail to address the affordability problem that led most OA advocates to join the movement in the first place.

Indeed, the likelihood is that costs will increase rather than decrease, as the infamous big deal is migrated to the new OA environment (a development we are seeing with the contracts being signed with publishers by Dutch universities).

A second negative impact will be that the life of a publishing format (the journal) that the Internet should have pensioned off long ago will be unnecessarily prolonged. As a result, friction will continue to be imposed on the sharing of research, which will impede the progress of science.

Even if the flip strategy is not widely adopted, gold OA is fast becoming the method of choice for OA advocates and legislators.[1] After all, it is easier for everyone, and it does not require that research papers are embargoed before becoming OA. The watershed moment I anticipate is the point at which pay-to-publish gold OA comes to be seen as the only viable way of achieving open access, and legacy publishers as the primary providers of it. At this

[1] While the EU has just stepped back from a gold-only approach, I remain sceptical as to whether green OA will prove successful. In any case, it cannot address (and indeed will exacerbate) the two main problems I want to discuss here (affordability and quality), since it depends on and supports the legacy journal.

point the Oligopoly will have appropriated the OA movement, and in a way that suits them more than the research community (since it will allow them to continue making excessive profits from the public purse).

When that happens, a revolution that was intended to free scholarly communication from commercial interests will itself have fallen prey to them. And a movement that was meant to reinvent scholarly communication for the networked world will have settled for an unsatisfactory compromise in which the life span of a print model past its sell-by date will be wantonly and needlessly extended.

The problem is the very existence of journals

This point was made to me last year by Vitek Tracz, the founder of the first OA publisher BioMed Central (BMC): "[S]cience today does not need journals (no one reads journals; everyone reads articles)."

Tracz added that it is the very existence of journals, and the way the Impact Factor (IF) is used to rank them (which in turn determines the methods used by journals to make editorial decisions) that now poses the greatest obstacle to the revolution started by the open access movement. As Tracz explained, journal editorial decisions are "significantly affected by their battle to maintain and raise their Impact Factor (IF)."[2]

And it is by hiring, promoting and rewarding researchers on the basis of the prestige of the journals in which they publish (using the flawed IF as a proxy measure of quality) that the research community continues to allow publishers to capture the freely-given labour of researchers and then make excessive profits from it. Under the traditional subscription model this captured labour (writing and reviewing papers, and editing journals) is sold back to the research community in the form of exorbitant journal subscriptions. In the gold OA model publishers exploit the value inherent in this captured labour to charge extortionate article-processing charges (APCs).

So what we have learned is that if scholarly communication is to fully (and cost-effectively) exploit the Internet the research community will need to free itself both of incumbent publishers and of the journal. This is what the OA movement should have achieved, but has not. Instead, it is assisting legacy publishers relocate a broken and exploitative publishing model onto the Internet, without attempting to fix it first.

Right now therefore the open access revolution is stalling, and before it will be able to move forward again it will be necessary to recover territory that OA advocates are currently giving away to publishers.

But an important question arises: since the OA movement is now proving so willing to give up territory, who can we expect to recover the situation and complete the revolution the OA movement began?

[2] Ironically, today BMC publishes over 300 journals, and regularly boasts about its Impact Factors (see also here)! True, Tracz, sold BMC in 2008 and now devotes his efforts to another of his companies, F1000, but it underlines the problem.

In seeking to answer this question we should note that one group of stakeholders that has been noticeably underrepresented in the open access movement are researchers themselves. Yet it is they who are now having to bear the brunt of the new bureaucratic rules being introduced to advance open access (OA policies and mandates), and it is their labour that continues to be expropriated by legacy publishers.

It is also striking that researchers have always been lukewarm about (if not directly antagonistic towards) open access. For this this reason university administrators, governments and funders are now forcing OA on them in a top-down manner. But this lukewarmness is warranted. Researchers know that access is not the greatest problem facing scholarly communication today. It is the "publish-or-perish" culture that has come to dominate their lives, and the excessive managerialism that this has given rise to. Ironically, while the *raison d'être* of this managerialism is to ensure that the greatest value is realised from taxpayer's money its growth has been accompanied by a decline in the quality of published research. Moreover, open access appears to be exacerbating the problem rather than improving it.

Given this, and the fact that open access mandates are increasing the bureaucratic scrutiny that researchers are subjected to, scientists' concerns about the state of scholarly publishing can only grow. Might they respond by developing better solutions themselves? Might we see a new bottom-up movement evolve and complete the revolution the OA movement began?

Increasingly restive

Here, however, a new challenge arises: since what is required is a complete reimagining of scholarly communication senior researchers are likely to baulk at the prospect. This is because they have more to lose than gain from the changes required. As a researcher pointed out to the BBC recently, academia is a gerontocracy. And much of the power of that gerontocracy is exercised through funding committees, through oligarchic journal editorial boards, and through anonymous peer review.

As such, the task of reinventing scholarly communication would seem to fall on the shoulders of untenured and early career researchers, the least powerful actors in this drama. Moreover, with the growth of short-term and fixed-term contracts their positon becomes more precarious year on year. Challenging the hierarchical and increasingly bureaucratic world of academia, therefore, is personally risky for them.[3]

Clearly, therefore, there are significant hurdles ahead.

Nevertheless, young researchers are becoming more and more restive about the state of scholarly communication, not least because it is the primary tool used to oppress and control them (via the publish-or-perish regime). They are also sufficiently internet-savvy to understand the full potential of the network.

It is therefore no surprise that they are more receptive to alternative publishing models than their tenured elders. Indeed, many are busy developing new solutions themselves. Unsurprisingly, these solutions place great stress on egalitarian and transparent review processes, and more rational and fairer ways of measuring research quality. So the new

[3] In this context the *Guardian* article here is worth reading.

solutions they are developing invariably utilise open, post-publication peer review, and they are invariably fully open access.

One example is The Winnower. Founded by former Virginia Tech. grad student Josh Nicholson, The Winnower describes itself as "an open access online scholarly publishing platform that employs open post-publication peer review." And its stated goal is to provide greater transparency and accountability. In addition, it hopes to address the high cost of current publishing models. Currently it imposes no access charges and levies no publishing fee (although there are a number of cheap membership schemes and the service charges $25 to provide a DOI for articles published on its site.

However, perhaps the most interesting initiative in this space right now is the Self-Journal of Science (SJS) – which describes itself as a "new non-commercial, multidisciplinary repository that provides journal-like services to entrust the evaluation, classification and communication of research to the unrestricted collective intelligence of the scientific community itself."

Direct challenge

Founded 15-months ago by 35-year old French scientist Michaël Bon, SJS can be viewed as a direct challenge to the top-down power structure of academia, and to the oligarchic editorial boards of legacy journals. Fairness aside, says Bon, such journals are inherently inefficient, if only because they treat peers as competitors contending with one another for a limited number of slots in the high-impact-factor journals that cover their field.

By contrast, SJS' model is based on "convincing peers of the value of one's paper" using a crowdsourcing approach. This, says Bon, changes the relationship between researchers in a positive way, and improves the quality of published research. "Scientists are no longer competing for a rare thing (a limited number of slots in prestigious journals) but for peer recognition, which is as abundant as necessary. In particular, good articles do not succeed at the expense of another good article." By following such a logic, he says, "we can make scientific output much better in every respect."

SJS facilitates the evaluation of papers in two ways. First, when an author posts a paper on the system peers are invited to assess its *validity*, and to comment on and review it. Second, registered users of SJS are encouraged to create their own "self-journals" in order to "curate" articles in a specific subject area, both their own papers and papers authored by others. These may be hosted by SJS or they may be on third-party sites elsewhere on the Internet. When a paper is added to a self-journal, says Bon, the "owner" of that journal is making a statement about its *importance* (more on this below).

Fittingly, unlike the traditional blind, pre-publication review process – which Bon describes as a "peer trial" where the few judge the many – the SJS process is transparent, bottom-up, and inclusive. As Bon puts it, "Every peer is potentially a benefactor of your article, and reviewing becomes a positive social interaction that brings life to articles, and visibility and gratitude to (relevant) reviewers."

It is worth noting that when he conceived the idea of developing SJS Bon was unaware of the open access movement. His objective was to fix what he sees as serious problems in the current scholarly communication system – problems of quality, of transparency, and of

effectiveness. For instance, he says, the current certification system is often vulnerable to problematic biases – as a result of things like "fame, fashion, misleading narrative, fraud, clientelism, randomness of the peer review procedure, or simply uncommitted or time-pressed referees."

It is for this reason that the evaluation process utilised by SJS is consistently non-anonymous and always transparent.

When Bon did become aware of the open access movement he concluded that OA advocates have been trying to do things back to front, and as a result have played into the hands of publishers.

As Bon puts it in the Q&A below: "The OA movement has been fighting the wrong battle (all be it for a just cause), and for so long as it carries on doing so it will continue diverting and exhausting scientists and institutions in a fool's game in which they have little power."

That is, in seeking to fix the access issue prior to fixing the structural flaws in the current publishing system the open access movement is overseeing the relocation of a broken model into a new environment. By contrast, says Bon, SJS is focused on exploiting the new environment to reinvent scholarly communication. In the process, he says, the access issue is solved collaterally – since openness is a given in SJS' *modus operandi*.

Moreover, adds Bon, since SJS' costs are essentially the costs of storage alone, it is vastly less expensive than the traditional model.

Initially I struggled to grasp exactly how SJS works (notably the self-journal)[4], but when I did, I found the philosophy compelling. Others are also clearly impressed: Earlier this year, for instance, long-time OA advocate Bernard Rentier posted an encomium of SJS on a French mailing list. In a subsequent email to me Rentier said, "I am very much in favour of the replacement of oligarchic editorial boards and reviewers by an open and transparent reviewing or commenting system."

Everything is public

Of course, building a better mousetrap doesn't guarantee the world will beat a path to your door, particularly when all the incentives are pulling in a different direction. It is, therefore, no surprise that to date just 24 articles have been posted on SJS.

But it is attracting *some* researchers. Pierre Hosteins, for instance, a 35-year old postdoc at the University of Turin, has twice published with SJS (here and here). When I asked him why he replied: "[M]y primary motivation for publishing on SJS is actually to help it grow because I like its spirit."

So is publishing with SJS no more than gesture politics, a symbolic act to support a just cause? Or are there tangible benefits for authors?

[4] For SJS' official explanation, see Bon's article *Principles of the Self Journal of Science: bringing ethics and freedom to scientific publishing*.

Yes, there are, says Hosteins. “It is nice to have my work online asap. This means that people can read it and be aware of it before I have completed the old-style publishing process that takes a year or more. It’s also very nice to have comments on my work – that’s definitely a great feature of SJS that I would like to see used more often in the future.”

Hosteins also likes the transparent way in which the commenting takes place. Not only does it allow authors to improve their papers, but others can learn from the process too. “Everything is public (so anyone can benefit from the suggestions made) and the author is able to provide a public answer.”

In addition, researchers can publish papers on SJS that traditional journals generally will not publish – e.g. reports of failed experiments and negative results. These can provide useful insights, says Hosteins, and prevent other researchers from wasting time going down a research *cul-de-sac*. “Such failures are seldom publicized or published in the traditional system.”

Above all, he adds, SJS “provides a forum for exchanging information about research results and papers in which everybody is identified by their proper name. The hope is that this will allow public and constructive discussion about science to take place that will stimulate further scientific contributions. So SJS is one of a number of new tools that, to me, are clearly the future of scientific communication.”

Eye opening

When they are willing to try it, more established researchers can also appreciate the benefits of transparent public review. When in 2014 he published a paper on the new-style publishing platform F1000 Konrad Hinsen, a 50-year old researcher working at the French national research organisation CNRS, found the experience to be “eye opening” and “so much more constructive than the traditional anonymous process.”

Posting a paper on SJS was for Hinsen the next logical step, since it “takes that idea to the next level: there is no more distinction between author, reviewer, and editor. Everyone can take any role.” The real attraction of SJS, he adds, is its “radically bottom-up publishing model for scientific research.” This allows for “constructive interaction between scientists in a non-hierarchical way”.

Hinsen also likes the fact that SJS imposes no constraints on topics, length, format, etc. “You can publish a science blog on SJS if you want.”

Hosteins points to other benefits of SJS’ approach to open peer commentary. For instance, he says, comments tend to go “directly to the scientific substance and a little less to the presentation/form of the paper.” In addition, “judgements about the validity of the work are not made on the basis of the reputation of the journal.

Sergey Kirgizov, a 28-year old temporary teaching and research assistant in Computer Science at the University of Burgundy, is another SJS fan. After posting a paper on the service last year, he was soon engaged in a helpful conversation about his work. In the process, he says, Bon proved that a certain property for his definition of graph density did not hold. “The question of whether this property holds was openly discussed in my paper and was solved as a result of Michaël’s contribution on SJS.”

While this may not have been exactly the result Kirgizov was hoping for, the visibility his work gained in the process led to two Italian bioinformatics scientists contacting him. Following an exchange with them it was decided that they would all co-author a chapter for a book. "There is a chance that SJS played one of the principal roles in getting my work noticed," says Kirgizov.

As noted earlier, the other part to SJS (from which the title of the service derives) is the ability for users to create their own "self-journals". A number of researchers are currently doing this, including Hinsen, who manages a self-journal on the use of computers for understanding scientific problems.

"A self-journal is a bit like a small review article, but it takes much less time to prepare," he explains. "First you select the articles you want to include. This can be anything with an Internet reference: SJS articles, of course, but also articles from other journals, and also Web resources that have not been formally published, such as technical reports or blog posts. You then write a 'curator's comment' on each article, and an 'editorial' to introduce your topic.

He adds: "My first issue has articles spanning over 40 years, from 1974 to 2015. Two articles are internal reports from MIT, one is a preprint, and the remaining three are regular journal articles. This illustrates that SJS has important differences to traditional journals and their issues, which in the electronic universe are little more than publication time stamps."

Thus, where commenting and reviewing papers that authors post on SJS is intended to establish the *validity* of the science in it, the function of the self-journal is to signal the *importance* of articles. After all, a researcher would be unlikely to include a paper in a self-journal unless s/he believed it makes an important contribution to the subject.

Hinsen puts it this way: "In contrast to a citation or a tweet, a reference in a self-journal is a clear endorsement and recommendation. And someone who makes a good self-journal issue is very likely an expert in the field, so the network also helps in identifying experts."

Million-dollar question

Clearly users are enthusiastic about SJS. But the million-dollar question is whether it can succeed in its aims.

After all, researchers know that if they want to advance their careers, or get funding, they have no choice under the current system but to publish in prestigious journals that have an impact factor. This is especially true for young researchers, who are still hoping to get tenure and/or who need to build a marketable research profile. The harsh fact is that the gerontocracy that control journal editorial boards and appointment committees, and the bureaucrats that manage universities give little credence to research published on new-style publishing platforms like SJS.

As Hosteins points out, "it would be a suicide for my career not to publish in a traditional journal with an impact factor. This is not something I am happy about but it's a reality I have to take into account."

Kirgizov notes that while it is not technically difficult to create a web-based service where people can publish and discuss research papers (he has created one himself here), "it is much more difficult to find scientists who will publish their papers on your site."

Hinsen suggests that the challenge SJS faces is to some extent an existential one – since it has neither an impact factor nor an informal reputation in a world that believes these things are essential. "And by construction this will never change. So anyone concerned about bibliometric judgements will likely hesitate to publish on SJS."

On the other hand, Hinsen adds, SJS allows authors to publish their articles in other venues as well. "So one could view it as a preprint server, much like arXiv, but with a social network attached."

Bon makes a similar point. Posting papers on SJS, he says, can be viewed as an activity that researchers do in parallel with (or prior to) publishing in regular journals. "This means that a scientist who wants to put value into SJS can do so without sacrificing anything: he/she can simultaneously play the impact-factor-based publish-or-perish game, at least for so long as it prevails. As such, SJS offers a model for a transition towards open and free science that is continuous and safe for scientists."

Triggering systemic changes or supporting the status quo?

But if SJS ends up being an adjunct to the traditional journal publishing system, how can it hope to transform scholarly communication in the way Bon believes it should be? After all, arXiv has been operating for 25 years now and while it has acquired a great deal of prestige it has hardly upturned the publishing system. Its users invariably go on to publish their papers in journals, in the way Bon suggests they do with SJS. Even if it were to be widely used, therefore, SJS would surely only sustain and support the status quo, not overturn it.

So how can SJS trigger the "critical systemic changes to the way science is done" that Bon believes are essential.

When I put this to Bon he asserted that it will happen at the point when articles start to have different trajectories in the two systems – i.e. when it is possible to see significant differences between the published version that has undergone a traditional review process at a journal and the SJS version that has undergone open peer review. "That is the difference between a system optimized for impact and a system optimized for quality."

When I emailed Rentier I asked him how he felt SJS compared with the other new services that practice open peer review – services like F1000 and ScienceOpen. Echoing Hinsen, he replied: "SJS has not built a large set of pre-selected potential reviewers. For this reason, it does not seem to inspire the same confidence, (which goes to show that confidence remains linked with prestige). This characteristic is both an inconvenience (for the efficiency: so far, very few articles) and an advantage (for the principle and the ethical side)."

While he agrees that this is an issue, Bon points out that anyone who takes the time to understand how SJS works will quickly "come to realise that it is they themselves who are the editorial board of SJS, and that the service provides them with a much better set of tools than is available with a traditional journal. At that point they realise that what might seem to be a disadvantage is actually SJS' primary strength."

What is clear is that in the age of the Internet the traditional publishing model no longer makes sense, and in any case is deeply flawed. This means that scholarly communication will have to be reimagined. The problem is that with legacy publishers quietly appropriating open access, the necessary changes look increasingly less likely to take place, at least in the short term. In fact, they could be delayed indefinitely. In the meantime, an unnecessary drain on public funds continues, and research quality is declining, even with open access.

Consequently, both SJS and the other new-style services being deployed have a mountain to climb before the revolution that the OA movement began can be completed. Certainly we can expect it to take much longer than anticipated.

Desperately seeking an alternative publishing system

One researcher who has gained a worthy reputation for taking on legacy publishers is Cambridge mathematician Timothy Gowers. In 2012, for instance, he organised the "Cost of Knowledge" boycott against Elsevier. When I spoke to Gowers recently, however, it was evident that he has become less optimistic about the time it will take to change things. He said: "[I]t is not realistic to ask the commercial publishers to change the system in a way that would drastically reduce their profits, so it is necessary, it seems to me, to create an alternative, much cheaper publication system that can build up a reputation to the point where there is no longer any point in using the much more expensive system. That could take a long time, but it will take even longer if we do not even start."

That is why Gowers' decided to create the overlay journal *Discrete Analysis*. And in this respect his views fit with Bon's – both see the need for the research community to build its own alternative system (although Bon believes a more radical approach is needed).

The good news is that a host of new researcher-led publishing initiatives are emerging today. As Kirgizov points out: "The number of sites that offer a similar service [to SJS] is fairly big, and includes Philica, Naboj, GitXiv, *n*Lab, and the recently launched *Discrete Analysis*. There are also web-based forums specially designed to discuss research level mathematical problems, for example the famous MathOverflow."

The hope must be that these initiatives will jointly create the alternative publication system that Gowers and Bon believe is necessary. It clearly helps that the Internet allows multiple services to be aggregated in a federated way. As such, the challenge will lie in integrating these new services into an effective distributed system. Consider, for instance, how an annotation service like Hypothes.is could provide valuable commenting functionality to overlay journals like *Discrete Analysis*, or publishing platforms like SJS.

There are many other possible synergies one could imagine. And perhaps this is the model Bjorn Brembs had in mind when last year he outlined his vision of what a modern scientific infrastructure could provide. Were such a strategy to play out, the hope would be that at some point the new infrastructure provided a better, more, attractive publishing model than the legacy system, and so began to win large numbers of researchers away from legacy publishers.

It will help that there is growing push back against the use of the IF.[5] We can also see the notion that preprints ought to be treated as acceptable scholarly outputs in their own right gaining traction – although whether they will ever be viewed as valid alternatives to papers published in journals remains uncertain. (See, for instance, this discussion of the recent ASAPbio meeting).

All that said, as Brembs elsewhere points out, creating an integrated alternative system would require a lot of collaboration within the research community. The potential hurdle here is that researchers and research institutions are increasingly incentivised to compete more than co-operate.

Additionally, creating an alternative infrastructure would require funding, and funders tend to feel that their job is to fund research, not infrastructure. When they do provide money it tends to be only for short-term projects, so sustainability is an issue. This is another nettle that the OA movement should have grasped, but failed to do so. As a result, we are now witnessing what CrossRef's George Bilder describes as the "enclosure of scholarly infrastructure".

This is all too apparent if we consider the way in which Elsevier has been acquiring key parts of what infrastructure has been created to support open access – e.g. Mendeley and more recently SSRN. So time is not on the side of the research community.

It is possible that in, say, ten years' time we will look back and discover that a viable alternative system has emerged, and that it is controlled not by multinational for-profit companies but by a combination of non-profit ventures and research institutions themselves.

On the other hand, we may see that for-profit companies have acquired a controlling interest in the new infrastructure. This could see a kind of Fourth Enclosure take place[6], with publishers building powerful data analytics businesses from the electronic trails scientists leave behind as they publish, share and discuss their research online. Instead of expropriating researchers' labour, publishers would be expropriating these data, which would then be sold back to the research community in the way that publishers sell research back to its creators with journal subscriptions today. Importantly, it would be one more way in which publishers were able to hoover up taxpayers' money.

For me what is most striking in all this is that creating a 21st Century network-based scholarly communication system is being hamstrung not just by legacy publishers looking to protect their profits, but by a gerontocracy keen to preserve its power, and an army of bureaucrats who assume that academia is just another business subject to regular market forces. These three powerful agents have been holding the future to ransom, happy to continue propping up the legacy journal, and perpetuate the IF game, not in order to assure effective science, but because doing so makes their lives easier, and allows them to maintain control of today's top-down power structure, a structure that is getting in the way of science.

[5] When I sent the draft text of this introduction to Bon he replied, "I think it worth emphasizing that SJS is the only solution that can generate reliable metrics that could gradually be used to replace the IF. Other solutions either try to have an IF, an approach which will never allow them to challenge the establishment, or they have no metrics, which makes it impossible for most evaluation committees to recognise them, since they are not going to stop resorting to simple numbers any time soon. So strategically SJS is a more rational choice, and offers a complete solution if you are looking to achieve a systemic change."

[6] See here and here for background.

In conclusion, the OA movement is approaching a watershed moment and looks set to succumb to gold fever. In doing so it will take a wrong turn, locking a flawed publishing system into the new online environment. It will also waste public money. What happens next, and when, however has yet to be established.

What I do not doubt is that completing the revolution the OA movement began will require recovering territory that open access advocates have voluntarily ceded. And it would seem to require the emergence of a new bottom-up movement to replace the top-down authoritarian process that open access has become. It is for this reason that we should welcome initiatives like SJS, and that is why we should be actively supporting them.

Read on to find out more about Bon's philosophy and objectives.

The interview begins …

RP: Can you start by saying who you are, how old you are, and what your research interests are?

MB: I am 35, and a scientist. I have a Ph.D. in biophysics and I am a specialist in problems related to the prediction of the secondary structure of RNA, including pseudo-knots.

RP: What is your background, where are you based, and why did you develop the Self-Journal of Science (SJS)?

MB: I am French. I was born and raised in Marseille and I currently live in Paris.

After two post-docs, I felt that for so long as the publishing system that validates and values science is not itself scientific then scientific research may be pointless. After I got a number of intuitions about how it could be corrected I decided to take action and offer SJS to the scientific community.

In order to do this, I've temporarily left academia to build SJS. I hope to go back in the near future.

RP: Who did the development work on SJS and when was it launched?

MB: SJS went live in February 2015. It was developed by me with the help of two professional software engineers. Everything has been created from scratch. LaTeX and MathJax are the only things SJS uses that we have not developed ourselves.

I would add that although most of the concept of SJS has been implemented, it is still in beta development.

RP: Was there a particular incident that caused you to lose faith in scholarly publishing, or was it more your observation of its faults over time?

MB: I love your use of the word "faith" here: the fact is that the current system is based on something akin to a religious belief. Personally I never understood this faith. Rather I was immediately struck by the cold absurdity of the system.

RP: Can you expand on that?

MB: What I uniquely love about science is that it is the only human activity in which people with different opinions and beliefs can rise above their respective prejudices in order to reach agreement on something, and the way that it forces them to endlessly discard erroneous and outdated ideas as science progresses.

At the core of my commitment to science was a desire to talk with my peers, but I realized that as soon as I want to put something into print the scientific community falls away. I have to talk to an editor, and comply with the requirements of two anonymous people (referees). Only then can I see my work appear on a journal's website. But what is really gained from that? My only joy was when (on very rare occasions) I subsequently received an email from somebody asking me a question about my article.

After receiving many unhelpful referee reports (routinely asking me to run my algorithm on a few more databases and to cite articles that happen to have the same author) my concern accumulated. Likewise, when acting as a referee myself I often found that the authors of the articles I had reviewed had simply ignored my comments and gone off and published their papers "as is" elsewhere.

Yet when attending conferences, I could clearly see that most scholars still have a passion for science and long for – and genuinely enjoy – good debates with one other about it. The problem is that none of this has any impact at all on the publishing process. So while most individual scientists appear to be well-meaning and competent people their scientific output is invariably disappointing.

It took me a while to connect things up and understand how we have ended up where we are, and what is needed in order to restore a virtuous collective endeavour.

Problem and solution

RP: Your point is that the scholarly publication process encourages and facilitates the problems you describe?

MB: Definitely. The current system (publishers and funders) values science in a vertical manner, through its top-down certification by a local authority (an editorial board) at one point in time. The prestige attached to that authority is directly related to the "impact" of the articles it has published in the past, where impact is a notion of secondary importance to the quality of the papers and, what's more, quantified by means of a metric that is full of flaws and perverse incentives – i.e. the Impact Factor (IF).

Each authority will select articles according to its own policy, prejudices and interests (financial, competitive, scientific…) and organize its private gatekeeping process around

those. I prefer to call this a "peer trial" rather than peer review. The main goal in the life of a scientist is to successfully and repeatedly pass such trials, preferably in journals with the highest possible IF.

This logic has strong negative effects on the type and quality of science. Local, finite-time peer trials can achieve very little in terms of quality (and especially reproducibility) and all sorts of biases can influence the certification of an article – fame, for instance, or fashion, misleading narrative, fraud, clientelism, randomness of the peer review procedure, or simply uncommitted or time-pressed referees.

The verticality of the system, i.e. the fact that science is controlled by a tiny minority of editors, also leads to very conservative science. Worse, it turns peers into competitors, who contend with one another for a slot in the high-impact-factor journals that cover their field. As such, the process of reviewing articles is inherently conflicted, since it may lead to rejection. Peers have divergent interests and this has powerful negative consequences on the whole research enterprise. In particular, science loses its ability to self-correct. In addition, peers tend to avoid each other and find "silos" where they can publish easily, rather than seek to tackle big problems that would require collaboration and sharing.

RP: It is your belief that SJS can address these issues?

MB: Yes, that is my belief, because SJS introduces a new way of valuing science, as well as new metrics that funders can easily adopt. The logic of SJS is that a scientific item is valuable when it succeeds in convincing peers, not just one authority. When that happens the process of publishing, and the result, are very different. Every peer is potentially a benefactor of your article, and reviewing becomes a positive social interaction that brings life to articles, and visibility and gratitude to (relevant) reviewers.

Importantly, it means that scientists are no longer competing for a rare thing (a limited number of slots in prestigious journals) but for peer recognition, which is as abundant as necessary.

In particular, good articles do not succeed at the expense of another good article. So long as good self-regulating mechanisms are used, I believe that this novel economy of knowledge can make scientific output much better in every respect, by replacing the "publish-or-perish" mind set with "Do unto others as you would have them do unto you". And that is the goal with SJS.

RP: Can you say more about SJS?

MB: SJS is a non-commercial open repository with free journal-like services that work on a community basis. The goal is to make SJS a scientific public space, i.e. an ideal environment in which science can be undertaken and published in a way that is true to its ethics, and in a way that encourages the highest possible quality standards.

The best starting point to understand the difference between SJS and everything that has gone before is the way that it creates value. With SJS the value of a paper is based on the degree to which it is able to convince most peers. Value is created and exchanged horizontally, and in a way that fosters collaborative behaviours and relationships between scientists channelled towards maximum quality, while strongly incentivizing openness.

SJS returns to every researcher their full identity as a scientist (i.e. as a researcher, reviewer and evaluator of science), and in a way that allows them to act as free agents. SJS provides every scientist with the tools necessary to undertake all the functions associated with what today is referred to as "publishing" (peer-review, evaluation and classification), and on a community basis that is self-organized and self-regulated. In this environment, peer-review and evaluation take on a completely different meaning and social function. It ensures that the claims made by a member of the community are solid, and not simply a product of their own prejudices, or of those of the scientists who verify their work.

This comes with novel metrics that reward quality, openness and fruitful interactions and these can be easily adopted by funders to further promote SJS' novel way of creating value.

RP: So the emphasis is less on individuals, more on communities?

MB: Right, but while there is a strong emphasis on community, the individuality and uniqueness of each scientist is also central to SJS. Individuals are as free as they can (and should) be and they have so many more ways to shine than in the current system.

The difference is that the value of individual actions comes from the community and not only from one or several authoritative individuals. However, it is important to understand that with SJS the community is not the mob, since there is no anonymity. The community consists of a set of known and responsible individuals sharing the same core principles.

RP: Does SJS accept papers in any discipline?

MB: Yes, but I would prefer to express it by saying "SJS hosts all science". SJS does not "accept" papers, since there is no authority that filters input to the platform. Users can upload whatever they want, with the only constraints being that they authenticate themselves and then sign their work. They must also be open to criticism.

In addition, I would stress that SJS can host more than just "papers": the format of what can be uploaded is limited only by technology, not by any policy.

This freedom of format is essential in most fields. Today there is more in science than "research articles" and "review articles" (e.g. reports of inconclusive experimental results), and scholarly communication can be enriched by using novel digital technologies – by, for instance, using interactive SVG, videos, or the ability to run algorithms on the same page as the information is presented theoretically.

These capabilities are not yet available on SJS yet, but it is anticipated that we will provide them, and they will develop quickly once scholars start to use the service and collaborate to improve it.

The process

RP: Ok, so I submit a paper to SJS: what is the process it then goes through?

MB: You just upload it via an interactive interface. A notification is then sent to those SJS members who are following that topic. In addition, authors can invite peers themselves. So

the community is able to immediately start assessing its quality.

RP: How exactly is the quality of a paper assessed?

MB: By means of two criteria, both of which are judged separately, and each with its own metrics. The first is the validity of the article, which is an objective notion. The second is its importance, which is subjective.

Validity is established by an explicit positive or negative consensus within the community. This consensus is expressed by means of an open and non-anonymous choice between two statements: "This article has reached scientific standards" and "This article still needs revision". This is displayed at the top of each article.

There is then an open debate between the authors and any authenticated member interested in the topic. By authenticated member I am referring to the fact that it is necessary to become a member of SJS before you can upload a document or write a review. This is necessary because nothing on the site can be anonymous.

This debate takes place through an interface that allows authenticated members to embed their reviews and comments in the article at the appropriate point. Importantly, the reviews are not independent publications attached to the paper, they become part of the article itself, and so part of the scientific record (By the way, it also guarantees that reviewers' contributions have the same visibility as the article itself).

Reviews are not authoritative and it is up to the author to provide an appropriate reply and revise their article accordingly (previous versions remain online).

If they wish to, authors can ignore all the comments their paper receives, but since these comments are embedded in the article it would be detrimental to them to do so as their peers will see that the criticism has gone unanswered. It also means that it is in the interests of both the author and the reviewers that the debate is as enlightening and constructive as possible.

The author's goal is to reach a satisfactory level of positive consensus for their article. There is no equivalent here to the binary acceptance/rejection practised by traditional journals.

This process of validation is theoretically endless, since a scientific article must always be open to criticism. However, in practice the end point occurs when a consensus has formed and stabilized, a process whose timescale cannot be known in advance, before peers have started to talk with each other.

This whole process is unmediated and it is up to authors to reach out to their peers and get them to take part in the debate. The primary quantifiers of the process (i.e. its metrics) are the number of people who take part in this process, and the percentage that validate the article.

You asked about the process from the perspective of the author, but it is important to bear in mind that scientists are more than producers of articles: they are also always autonomous reviewers and evaluators of science themselves.

So the second way in which the quality of a paper is assessed is by establishing its importance. This is done by means of a particular curation mechanism.

RP: Ok, by curation I assume you are referring to the ability SJS offers users to create their own journals. This reminds me that SJS stands for Self-Journal of Science. Can you say something about this part of the service?

MB: Sure. SJS also provides tools to enable scientists to curate articles from any source, and every scientist is therefore able to be the editor of his/her own "self-journal". A self-journal is a structured selection of articles that the researcher is able to curate and release in topical issues. In doing so they can express and share their vision and analysis of their field.

Of course, users do not own the articles they curate. Nor are these articles necessarily hosted by SJS. If they are not available on SJS they are included as links.

In creating their own journals users are also asked to write an editorial explaining the topic of their journal, and the objective behind the choice of articles they include. It is also assumed that the journal will be released in issues. This is not a time feed to which articles are routinely and endlessly attached (as with Facebook for instance), since that would see consistency gradually lost and the journal would become subject to short-term effects.

To get a sense of how this works I would recommend you take a look at the self-journal created by Sanli Faez. In the first issue he provides a vision of his field. His selection of articles begins with an article published in 1911 in *Physical Review Letter*, and concludes with his own research project (which is available on SJS). When you have finished reading the issue, you have learned a lot and really want to see his research succeed!

RP: So creating a self-journal is not about publishing new papers, but creating a curated journal of existing papers, a kind of personal overlay journal that provides a personal view of what you believe are the important papers in your field? By including an article in your self-journal you are making a statement about its importance?

MB: Yes. A self-journal allows every scientist to talk about articles, theirs or others'. The fact that a scientist wants to talk about an article makes it important, for one reason or another. Again, this notion of importance is inevitably subjective and is well captured by curation in self-journals. The primary quantifier of the importance (i.e. its metrics) of an article is its number of curators. Other quantifiers can also be extracted because the process is very rich and completely transparent.

A self-journal can offer much more scientific value than traditional ones because, since it works on curation, it can integrate any scientific item (not only articles) available on the web. It is not subject to constraints of time, space and impact factor. It is made by one person, which implies a coherence in every issue, which is made explicit by an editorial.

So it is a novel means of scientific communication in which its curator is able to provide his/her analysis and vision and help others make sense of the scientific output, which is always a huge need.

Other uses can be thought of too. The self-interest of a curator is to offer something worthy for his/her peers to read. As such, he/she influences the evolution of the field as well as being recognized for his/her relevant reflexion, which will necessarily also benefit his/her activity of author and reviewer.

In order to maximise readers, I think it is clear that the best approach is to offer and maintain an informative quality selection, as thoughtful and enlightening as possible. This eco-system of self-journals can self-regulate to promote scientific quality globally. And it is extremely rich and contextual: beyond the mere number of curators, any one article can be appreciated in relation to the other articles it has been curated with in each self-journal issue.

Moreover, as an evaluation system, it is very robust and hard to game since it relies on public and signed scientists' judgments, and not on anonymous anecdotal events such as the number of downloads, views, tweets, etc.

RP: You describe SJS as a repository rather than a journal. What is the significance of this?

MB: I describe SJS as a repository because there is no editorial board to determine input and output on the website. Everything is in the hands of the users. Moreover, by being a repository SJS can also be used in parallel with current practices.

RP: How does it work in parallel with current practices?

MB: Consider, for instance, that all physics and mathematics journals now accept that submitted articles can be uploaded as preprints somewhere else, usually arXiv. SJS can be viewed as another repository of choice for any researcher.

This means that a scientist who wants to put value into SJS can do so without sacrificing anything: he/she can simultaneously play the impact-factor-based publish-or-perish game, at least for so long as it prevails. As such, SJS offers a model for a transition towards open and free science that is continuous and safe for scientists.

By the way, biologists are currently undergoing their own preprint revolution. So they might like to seriously consider using SJS. As I say, it is a repository that operates an open governance structure that could solve a lot of problems beyond simply speeding up the dissemination of scientific works (not least the reproducibility problem).

Moreover, SJS is a repository with a social structure. Scientists are treated as real people on the website: they have personal accounts, and are far more than just the metadata of their own articles.

They are also more than authors: they are full members of the SJS scientific community, with an autonomous ability to review and evaluate articles. This is especially important for Ph. D students and post-docs – the bulk of the scientific workforce – who are today generally invisible, powerless, and completely dependent on their PI.

RP: A number of new-style services like SJS have emerged recently, including F1000, ScienceOpen and The Winnower? In what ways do you believe SJS is better/more effective than competing services like these?

MB: By introducing a level of openness in their gatekeeping process F1000 and ScienceOpen offer some improvement over the current system, which is good. However, they retain an asymmetry of power between the scientists that are on the board (e.g. the "1000" of F1000)

and outsiders. For instance, the board retains the authority to decide who is an expert and who can recommend articles.

This hampers the creation of a community process and enforces a low upper limit to the quality of their outputs. As such, they are only able to produce the same kind of value as the rest of the system, and will therefore struggle to compete with powerful well-established legacy publishers.

These services also limit scalability, since everything that takes place on their platform must be controlled and *a priori* moderated by them. This limits their output, as well as their ability to reduce costs. By contrast, since the science is fully controlled by its users SJS is immediately scalable.
So even if these other new services are much better than the traditional model I believe they are unable to trigger a deep change in the publishing industry.

With regard to The Winnower: when I started SJS three years ago, this service was the closest to my vision of enabling a community process. However, it had yet to find a way of valuing things and now it has become a publisher. I consider this to be a mistake as scholars will have to choose between The Winnower and traditional journals. Most likely, they'll just publish there what they do not (or cannot) publish elsewhere. As such, it is unlikely to be considered a serious alternative, even though it is far closer to the fundamental ethics of research than traditional journals.

Open access

RP: The philosophy underlying SJS assumes that all the content will be available on an open access basis. So let's consider open access for a moment. The OA movement has two primary strategies for achieving open access – self-archiving by means of green OA, and pay-to-publish open access publishing by means of gold OA. What are your views on the respective merits of these two strategies, and where do you feel SJS fits within these two strategies?

MB: As you say, in achieving its goals SJS inevitably produces full openness and freedom in science (both as in free speech and free beer), not least because its *modus operandi* assumes there is no role for intermediaries.
But let me preface my remarks by saying that I believe scientific publishing suffers from a disease whose seed is the use of the impact factor. This has led to the privatization and fragmentation of the process of science, and a consequent loss of quality.

For this reason, when I began planning and developing SJS three years ago my aim was to restore quality to science. It was only afterwards I learned that there was such a thing as an OA movement; I was simply unaware of it as a researcher. Since then I have been extremely surprised to see the extent to which people talk about OA compared with the problems of peer review and the impact factor, which I consider to be the two most important problems we need to address. Closed access is just one of the many symptoms of the disease.

That said, if the research community wants to address the symptom alone then green OA certainly offers better palliative care than gold. Technical, of course, SJS relies on self-archiving, which is part of the green OA model. However, SJS includes a subsequent process that enables researchers to dispense with the need to publish in traditional journals, both in

terms of communicating their work and, in the future I hope (when SJS metrics gets official recognition), for the purposes of advancing their scientific careers.

But actually, I would prefer not to elaborate on open access, since what I think, and more generally what scientists think, has little impact on the problem. If the only way to value science is the IF, then those who deliver it are in the driver's seat and it is they who will decide the evolution of publishing. These people are generally interested in gold and hybrid, so unless we address the disease itself this is what we will get.

RP: What are your views on hybrid OA?

MB: I think this is the worst OA model. I've read financial reports explaining that it is so cool because it allows double-dipping, and in a way that makes it impossible for the customers to prove it is going on. Need I say any more?

RP: There is a view sometimes expressed that open access disadvantages younger researchers, since they are at an especially vulnerable point in their career. As a consequence, being published in high IF journals is viewed as essential for them. A physiology researcher at the University of Iowa, for instance, has suggested that if they want to support open access young researchers are likely to have to take a "career hit". She also said: "I think young people are often very motivated to try and change things, so they're most likely to be cannon fodder." Do you feel young researchers are more vulnerable here?

MB: Young researchers are certainly the most powerless, and for this reason they are the biggest losers in the current top-down system. It is also a reason why they are also the most motivated to change it. However, it's true that they are likely to become cannon fodder if the current OA strategies continue to be pursued. The aim of these strategies is no more than to recreate the same old system in the new environment – i.e. to offer OA journals with an IF that are owned by "good people".

To me this is unrealistic. Creating viable alternatives like this can only work if the journal can put together sufficiently prestigious editorial boards in order to overcome the absence of having an IF during the first two years. Moreover, such journals will not trigger the necessary systemic change we need since very few people can afford to launch them.

I am thinking here of journals like *Discrete Analysis*. Clearly the principle of a journal like this is a great improvement (and actually quite close to the self-journal feature of SJS…), but it will require at least two Fields Medal winners to devote a lot of time to the initiative in order to "save" at most 100 articles a year. When you realize that the founder of *Discrete Analysis* (Timothy Gowers) motivated 16,000 people to boycott Elsevier and (as he told you when you interviewed him) some mathematicians are already refusing to submit to his new journal, you are bound to conclude that this approach is strategically inefficient. Consider also that the French overlay journal project "Episciences" has yet to take off, despite having the investment and prestige of CNRS and INRIA behind it.

The simple truth is that you cannot overturn a deeply entrenched system by setting out to replicate it. The way to achieve systemic change is to avoid competing with the existing system (or at the very least compete with it on different terms). I was very aware of this when designing SJS.

Since SJS is a repository it can achieve its goal with preprints alone. Where the current system focusses on impact, SJS focusses on quality. Young researchers can upload, review and curate articles in order to create an alternative value system with SJS, but in a way that need not compete with what they have to do to advance their careers under today's rules.

Using SJS is both in their own self-interest and beneficial for the wider research community. My hope is that we will not have to wait too long before they start using it.

RP: I hear what you are saying, but the current signs are that research funders and institutions have become impatient with how long it is taking to transition to OA, and so are now looking to speed things up by persuading publishers to "flip" their subscription journals to gold OA. What in your view are the pros and cons of such an approach, and what might be the implications of this strategy for new-style services like SJS?

MB: As I mentioned, I have attended lectures given by financial analysts. Here they explained that publishers now see OA as an opportunity for growth. So it is clear to me that big publishers already have their own roadmap for achieving full OA.

And whatever they say to the contrary, the transition will take place over a very long period of time and with the usual fool's game in which publishers force their business plans on the research community and constantly increase their prices, while offering institutions some concessions to allow them to claim that they have managed to negotiate something to the benefit of their institution. Of course it will be gold OA, and of course it will be more expensive, which apart from anything else will involve taking as much as possible from developing countries through the imposition of APCs.

So I don't see much in the way of pros here. The biggest con is that the OA movement has been fighting the wrong battle (all be it for a just cause), and for so long as it carries on doing so it will continue diverting and exhausting scientists and institutions in a fool's game in which they have little power.

Elsevier is a convenient scapegoat that allows researchers to persuade each other that scholarly communication is in a mess because publishers are shamelessly bad people. In reality, we are the ones who have been persistently wrong for the last 50 years. It was *we* who allowed science to be privatized by adopting the IF. *We* created all these "nice little captive markets" and Elsevier has just been the smartest to take advantage of it.

What is on life support right now is quality, not access. To be provocative, I would suggest that since there is an irreproducibility rate of 90% in cancer research, closed access may actually be doing more good than harm to the general public, since it prevents people being able to read the articles. The only way to restore quality is by facilitating a community process that, thanks to today's digital technologies, can be easily and cheaply provided.

Unlike OA (which most researchers have little interest in), restoring quality is an issue that appeals to every scientist. Moreover, the way in which I propose doing it will mean that OA will be in the self-interest of every scientist. So OA will be a natural consequence of improving quality, and I believe that SJS offers a much better, quicker way to achieve it.

To put it another way, the current strategies for transitioning to OA will prove financially

exorbitant, will take a long time to achieve, and are unfaithful to the spirit of openness. Achieving higher quality science, open access, reproducibility, and freedom and collaboration between scientists all at once is paradoxically much easier than anything the OA movement has yet come up with: all that is required is to provide a transparent and community-based evaluation system. Vitally, this solution does not depend on anything Elsevier does or does not do, but lies fully in the hands of academia itself.

Reproducibility

RP: You have said several times that SJS can help with the growing reproducibility crisis in science. Can you expand on that? How exactly can SJS help?

MB: Yes, I believe that SJS can fix the reproducibility problem, or at least reduce it significantly. Let's split the causes of irreproducibility into two main categories: first there is the difficulty of enforcing good standards and practices, second there is the absence of incentives for verification and replication.

On the first issue: this can be addressed by SJS' open peer review approach. Good standards naturally emerge and spread when the community talks openly about them. Let's consider, for instance, the well-known example of the poor standards of statistical analysis in biomedical sciences, which tend to assume that a signal is significant when a $p<0.05$ can be calculated, without other considerations. This is a typical example of how erroneous and conservative peer trial (i.e. a journal's peer-review process) can be.

To review an article in the field of cell biology, editors will always recruit cell biologists but no expert in statistical analysis to review the underlying data. As a consequence, peer trials incentivize an endless process of self-reproduction of the problem. Reviewers who are unable to assess this aspect of the paper's claims simply replicate the same error. Those who are competent to make an assessment are unable to break the vicious circle since the details of the reviews remain in the black box that is the editor's mailbox.

With SJS' open peer review, by contrast, competent individuals need simply select a few articles that have had a large readership and review the statistical part, and then openly explain why it is insufficient, and what should be done to fix it – and this happens in the form of a discussion with the authors.

Since the discussion will be embedded in the article everyone will be able to see the start point, and review the process and the result of the peer review. And of course they can also join in the discussion at any time, and to have their say on the standard that emerges. Such peer review acts as an open and interactive manual able to correct statistical analysis, and it is immediately available to everybody. It would be enough to do this with just a few well-chosen articles in order to quickly reach a broad audience.

Open peer review is the natural way for science to self-correct. I've heard people suggest that we need a global education program to train scientists in good standards. But I find this puzzling. How could it be organized on a global scale? Who would be the teachers and on what authority could they say what is a good standard? And by the time the world's researchers have been educated in the standard it will probably be out of date.

RP: You are talking about crowdsourcing agreement on a standard, a bottom-up rather

than top-down approach, or what you call a horizontal rather than a vertical process?

MB: Yes. Meanwhile SJS' method of evaluating research by means of curation using self-journals addresses the problem of providing incentives for replication, the second category I mentioned. Today replication studies are discouraged because they are not considered citable enough. SJS' curation system, however, promotes what scientists regard as important, and it is extremely likely that a scientist interested in a particular standard will also be interested in knowing whether this result has been confirmed or refuted.

In other words, if a novel result has been e.g. curated 200 times, the lab which decides to replicate it can reasonably expect the same level of curation. So there is a reward for replicating and this can be known beforehand. As a result, novel results will be especially likely to be replicated as they are regarded as important. All of this provides a way for science to move forward confidently.

RP: As you know, Rector Emeritus of the University of Liège and well-known OA advocate Bernard Rentier is a fan of SJS. Earlier this year he posted a message on a French mailing list in which he said that he considers SJS to be the most interesting proposal he knows for solving the problems of scientific publication. When I asked him to clarify his thoughts by email he said: "I am very much in favour of the replacement of oligarchic editorial boards and reviewers by an open and transparent reviewing or commenting system." He added however that in not having a large editorial board SJS has put itself at a disadvantage. As he put it, "SJS has not built a large set of pre-selected potential reviewers. For this reason, it does not seem to inspire the same confidence [as services like F1000], (which goes to show that confidence remains linked with prestige). This characteristic is both an inconvenience (for the efficiency: so far, very few articles) and an advantage (for the principle and the ethical side) ... Also, F1000 started with a broad base while SJS has only Michaël Bon behind it. It may seem a bit fragile." Would you agree with this assessment?

MB: Yes, I do agree. The issue here is that the research community has become accustomed to thinking that top-down certification is the only way of doing things, with a small group of powerbrokers controlling the process and the rest of us left to be no more than passive observers, not active agents.

My view is that it would only take 20 minutes for someone to understand the concept of SJS. But the problem we face is that the first thing people do when reviewing a publication outlet is to look for a prestigious editorial board. When they do not find one they tend to lose interest.

Those who take the time to understand how SJS works, however, come to realise that it is they themselves who are the editorial board of SJS, and that the service provides them with a much better set of tools than is available with a traditional journal. At that point they realise that what might seem to be a disadvantage is actually SJS' primary strength.

What bears stressing is that even I, as the webmaster, have no power to influence the science that appears on SJS, which is one more reason why its potential is so great.

Partnerships, governance and funding

RP: Rentier talks of SJS having "only Michaël Bon behind it". This I think is no longer

the case. You now have a relationship with Open Scholar?

MB: Correct. Last September, I was joined by Open Scholar CIC, an open international organization committed to improving scholarly communication. Any researcher can join Open Scholar and I believe its governance model is the only correct one for science (i.e. science can only be governed by the scientific community, not by a publisher, not by an institution and not by a government, and the Internet has made this entirely possible now).

So we have teamed up with Open Scholar and SJS is now officially an Open Scholar project.

RP: How is SJS funded?

MB: So far I have funded the cost of all SJS development myself. Over the next year we hope to obtain some grant money in order to develop it further. In the long term I would expect SJS to be funded in the way that Wikipedia and arXiv are funded – through donations.

If scientists were to use SJS in large numbers, publishing costs would be around 1€/article. And as I said, they would also be of much better quality than anything a journal's local processes can produce. So we are not too concerned about the long-term funding of SJS. It is right now that we face a funding challenge!

RP: As I understand it, there is no publishing charge today, but might there be one in the future? Do you envisage authors ever being asked to pay any publishing fees/membership fees or other kind of fee for using SJS?

MB: If SJS becomes important I can see no difficulties in obtaining donations from institutions in the way arXiv is able to. The operational costs of SJS are so low that this is really a negligible fraction of what they currently pay for journal subscriptions.
SJS' operational costs are essentially just storage costs and maintenance. Today it costs 5€/month to store 10GB on the Internet, so if you assume 10MB of data per article (which is large), you can store an article for 10 years for 60 cents. I think this is the real cost of scientific publishing!

Actually I have also had the idea of enabling shared storage by the scientific community itself. The plan is to create a "download SJS" button. This would allow every scientist to dedicate e.g. 100MB of his hard drive to store science. With such a system all of science could be preserved by the community itself, with thousands of copies all around the world. In terms of security, this is much better than any other solution we have today.

RP: You said that SJS is a non-profit? Where is the organisation registered?

MB: Open Scholar is a CIC (community interest company), a non-profit organisation based in the UK.

RP: So is SJS now effectively "owned" by Open Scholar? How does the corporate structure/financial accounting work?

MB: The way it works is that Open Scholar has a working team. Any scholar can join Open Scholar, and every member who is willing to put in the work can join the working team.

Currently there are six of us. In terms of governance, we discuss what we want to do (via videoconferences, email etc.) and then take collective decisions.

Clearly if the working team grows to consist of tens of thousands of people (as I hope it will), we will have to adapt with that growth – e.g. by creating a formal structure of some type. But we would aim to always have a transparent and democratic decision-making process.

I should emphasize that these decisions only concern the technical aspects of SJS: the scientific aspects are entirely in the hands of SJS' users, which need not belong to Open Scholar.

RP: Am I right in thinking that you also have some association with Future of Research? If so, can you say something about this organisation and your connection with it?

MB: Yes, we have made this connection quite recently. The goal of the Future of Research (FoR) is to represent the voice of junior scientists in order to advocate for critical systemic changes to the way science is done.

As we discussed, one of the toughest barriers young scientists face is dealing with the publication system, and for this reason members of FoR are interested in initiatives like ASAPBio and SJS.

In particular, FoR plans to deposit preprints and publications in SJS and to create a Journal of the Future of Research within the system. This will allow people to read and discuss data analyses and policy recommendations relating to junior scientists. Of course, the main goal is to get junior scientists to use SJS on a regular basis.

RP: We agreed that open access is inherent to the way that SJS works. What about the licensing of the papers posted to the service, and what about open data?

MB: I hope you will see by now that SJS is committed to more than OA: it is committed to complete transparency and accountability in all its processes. Every click on the buttons in SJS is signed and dated. This is intrinsic to the self-regulation philosophy of SJS; members would not want to misuse the freedom that this gives them.

We have also discussed how complete openness is inherent to the SJS evaluation system. This includes both papers and data. Our philosophy is that when the goal becomes one of convincing all your peers openness is a real advantage. If you do not disclose your data, or your code, for instance, reviewers will tell you that your article cannot be properly assessed because it cannot be tested, so you will lose something if you are not completely open.

However, it is important to note that SJS does not enforce any policy whatsoever. It creates greater openness because of the way in which its processes value things, and the way they trigger collective endeavour.

On the question of licensing, this is not a topic I have given a great deal of thought to. Currently, everything that is uploaded or written on SJS is licensed under CC-BY-4.0. But if somebody competent can point to any possible problems (and solutions!), please do contact me or Open Scholar.

Achieving systemic change: the challenge

RP: SJS's philosophy is an admirable one, and its web site looks good. Yet as Rentier points out, it is not attracting many articles (currently it hosts 24), very few of which appear to have comments (which in any case tend to be simple statements rather than reviews). How do you hope to address the obvious challenge SJS faces in attracting users?

MB: That is indeed a serious issue at the moment. As an entirely community-based service SJS faces the eternal problem of community websites: how to achieve the critical mass of users needed to kick start the necessary dynamics? The fact is that people just don't know about SJS. So the challenge is to communicate, gain visibility and ignite those community dynamics.

I acknowledge that, to date, we have not come up with a good communications strategy. My hope is that at some point somebody with good communications skills – or an influential organisation like SPARC – will start advocating for SJS.

Another possibility is that SJS might catch the attention of a scientific leader willing to sing our praises. For instance, both Timothy Gowers (a Fields medal winner) and Michael Eisen (PLoS) advocate for many of the things we have built into SJS. Maybe they would like to take a look at what we are doing!

One potential early adopter group for SJS could be Ph.D. students and post-docs, who would benefit most from the novel methods of personal scientific communication that we offer them. Young researchers used to digital technologies have an immediate sympathy for the community logic of SJS. So we need to find a way out to reach out to them specifically, and I hope our new collaboration with Future of Research will be fruitful in this respect.

In the 90s an active community of Ph.D. students and post-docs put enough life into arXiv to enable it to become a standard for the physics and mathematics community. I think SJS is the right place for today's young researchers to gather together and create value.

RP: When we first discussed doing a Q&A you said that the problem today is not one of achieving open access but retiring the impact factor and the evaluation processes based around the IF and journal prestige. And you have said that OA is the wrong battle. How can services like yours hope to flourish until the way that scientists are evaluated by universities and funders changes, and how can that change be achieved?

MB: The example of arXiv or PubPeer shows that there are a people ready to do things that are not immediately rewarded by the system. Like, for instance, engaging in open peer-review, alternative evaluation methods, science blogging, open access, open data, etc. These things are all gaining mindshare today.

SJS is operational and already offers a unique way to consistently and virtuously connect all

these things, while being focused on a goal (retiring the IF) that most researchers are now sympathetic to.

So I think there are many entry points to SJS and enough energy out there to kick start the dynamics it could unleash. And once SJS is seen to be producing good science, with good debates that are able to improve the author, the reviewer and the article, I believe more people will want to begin experiencing the pleasure of talking to their peers in this way, and enjoying the associated benefits and kudos.

Even if it is not officially rewarded by the funding system today, public, non-anonymous and fruitful interaction between peers inevitably has beneficial consequences. For example, a Ph.D. student looking for a post-doc could write an insightful review of an article produced at a lab he/she is interested in, and also build that review into a thoughtful issue of his/her self-journal. Doing so would provide an excellent way for scientists to make contact with a lab, and then straightforwardly demonstrate their value, a value that may not have been captured by their publication list.

Again, contributing to SJS is not exclusive of anything else. There is no copyright transfer at any point so scientists can use the same material when they sally forth into the publish-or-perish jungle.

RP: You say there is a need to make "critical systemic changes" to the way that science is practised and communicated, and that SJS can trigger this change because it "offers a model for a transition towards open and free science". All that is holding SJS back, you add, is that it has yet to successfully communicate its benefits to potential users. At the same time, you say that SJS can work in parallel with the traditional publishing system. I spoke to a few researchers who have posted papers on SJS and I heard the same thing from them. But they also confirmed that they are simply not in a position to stop publishing in traditional journals. As a postdoc at the University of Turin Pierre Hosteins expressed it, "it would be suicide for my career not to publish in a traditional journal with an impact factor. This is not something I am happy about but it's a reality I have to take into account." I am wondering how SJS can hope to trigger systemic change if its users have to continue using the system that SJS is meant to replace. Might it not simply end up – as you suggest The Winnower might – publishing papers that researchers cannot publish elsewhere? The harsh fact is that in order to get funding, tenure and promotion researchers have to publish in prestigious journals that have an impact factor. Would you agree that this will inevitably restrict what SJS can achieve?

MB: As you can see, Pierre Hosteins has also uploaded the preprints of his latest articles on SJS. So as I have said, articles can go through both evaluation processes – the traditional IF route, which today is still necessary for careers, and the SJS community-based process, which is good for science, for authors and for reviewers.

So Hosteins is doing what I would like to see most scientists do, and I anticipated that he will also spontaneously review other interesting articles in his field that others upload to SJS. As I said, there are independent reasons to use SJS, including the ability to use novel autonomous tools that allow scientists to shine as reviewers or evaluators of science. It also affords the pleasure of actively contributing to science in a collaborative environment that publicly credits you for all the good things you do.

As to systemic change: the turning point for SJS will come when articles start to have different trajectories – i.e. when it is possible to see significant differences between the published version that has undergone a journal's local peer trial and the SJS' version which has undergone open peer review. That is the difference between a system optimized for impact and a system optimized for quality.

If enough scientists participate, I have no doubt that open peer review will always produce something that is superior to the output of local peer trials. So evidence that SJS provides a better way of improving scientific quality will accumulate. It will then be able to go beyond the set of scholars who are currently committed to open science, to reach all scholars. At that point it will be impossible for the funding structures of science and institutions to ignore SJS, especially when they can see that it costs nothing.

RP: Just to press you on this a little further: you talked earlier about value being created horizontally on SJS, rather than vertically, as happens with the traditional pre-publication peer-reviewed journal. It strikes me that today practically everything in the research environment is based on vertical power structures. Given this, SJS's philosophy is not consonant with the real-world environment that researchers inhabit is it? To put it another way, what you seem to be proposing is a bottom up revolution in a top-down world. Is that really feasible?

MB: Yes, it was a top-down structure that embraced and continues to sustain the impact factor, which provides what I call fake value. This fake value has become ubiquitous in the top-down structures that fund science and promote scientists.

But it is my bet that even today's funding structure, and the evaluation committees that manage it, are not addicted to the impact factor itself but to the comfort and security offered by being able to use cold numbers provided by third parties.

Most people are all too aware of all the shortcomings of the impact factor (and the h-index), but the practical and psychological advantages it offers to individual reviewers and evaluators are just too great.

The obvious way to address this is to propose better metrics: ones that are just as easy to use as the IF, and which provide the same feeling of security. SJS fulfils this need by providing quantifiers for the validity and importance of articles.

Moreover, the whole underlying process that builds the SJS quantifiers is highly qualitative, transparent, and can be dug into as and when necessary. Grant reviewers will certainly get much greater intellectual pleasure from working with information that has already been explicitly processed by the scientific community, while having the possibility, when needed, to go beyond the use of a simple number.

Consequently, once the community starts to build these numbers within SJS there is a real possibility that they will find their way into evaluation committees. I cannot provide you with a more precise scenario than that at this point in time. It depends a lot on who adopts SJS – e.g. whether all scientists in a certain field start to use it, whether some institutions or funders decide to promote SJS, or if some prestigious leaders being to sing our praises… A number of different arcs for adoption are possible.

In addition, over the long-term SJS will create an almost free publishing process (in so far as its publishing costs are more or less equivalent to storage costs). This argument may be particularly appealing to institutions.

RP: When you talk about SJS "providing quantifiers for the validity and importance of articles" are you referring to the voting system in SJS?

MB: I am referring to both the SJS voting system, which is indicative of a paper's validity, and to the curation process involved in researchers creating self-journals, which provides an indication of the importance of a paper.

RP: Thank you for taking time to speak with me. I wish you all the best with SJS.

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