OPEN SCIENCE STARS

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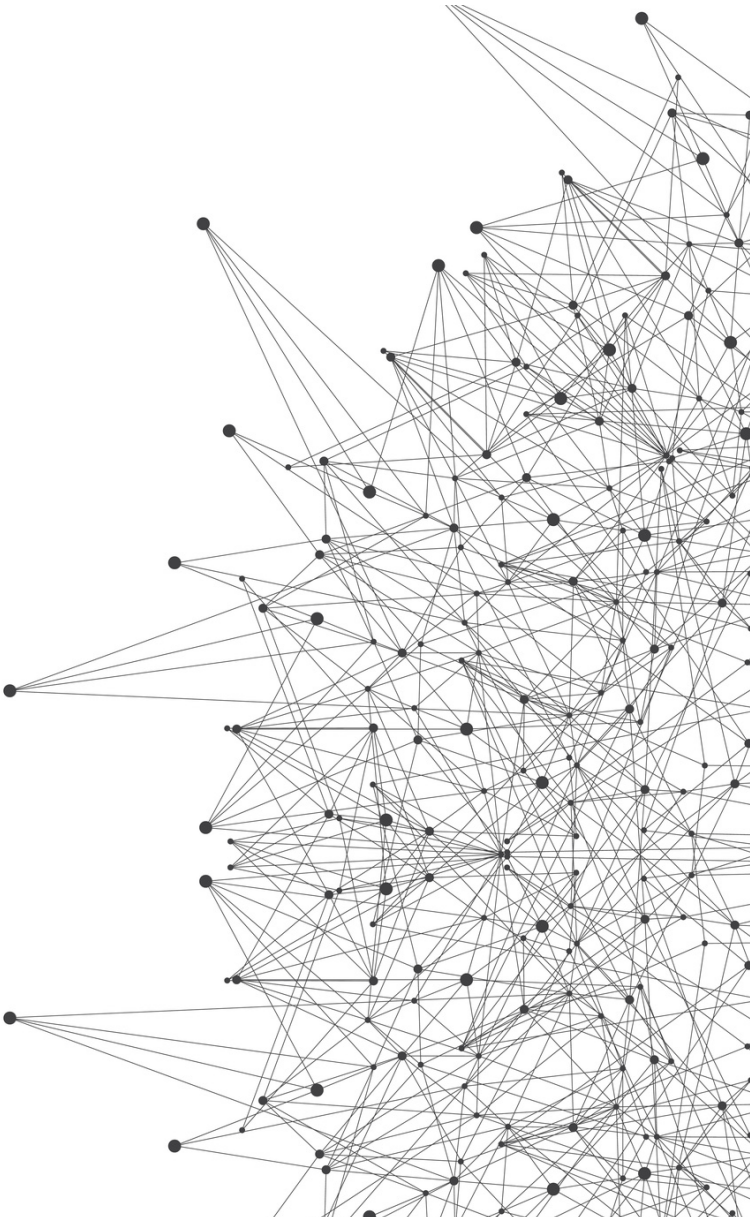
Happy Holidays from ScienceOpen!

As our thank you to all of our wonderful members and users, this year we have decided to give you a special gift. We've taken each of the individual interviews from our Open Science Stars series, which documents a range of experiences and perspectives into the world of Open Science, and assembled them here for you in one collection. Only by listening to and understanding truly diverse voices can we gain a deeper appreciation of the issues surrounding Open Science. By taking on board what others have to say and learning from them, we strengthen ourselves and the community, and understand how to put things into practice more easily.

Kind regards,

The ScienceOpen team



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CONTENTS

DR. JOANNE KAMENS

Figure 1. Image credit: Joanne Kamens

OPEN SCIENCE STARS: AN INTERVIEW WITH DR. JOANNE KAMENS

Hi Joanne! So can you tell us a little bit about your background to get things started?

After graduating University of Pennsylvania I went directly to graduate school in the Harvard Medical School Division of Medical Sciences where I received a PhD in genetics. For you historians, it was the first year that the Division existed allowing students to move around PIs in many departments. I defended my thesis while 6 months pregnant and had my son while still working in that lab. I had a great mentor in Dr. Roger Brent (now at the Fred Hutchinson Center in Seattle). I studied transcription using yeast and helped demonstrate that an acidic domain of the Rel protein was activating when brought in proximity to the promoter region. Again for historical perspective, PCR was invented while I was in grad school and I got to beta test the first MJ research PCR machine (M worked on my floor) which had no outsides. Roger Brent's lab was one of the labs that created the yeast two-hybrid screening system and I have always been a lover of molecular biology technology which serves me well at Addgene.

You've won several amazing awards, including the 'Forty over 40' award for women who are making an impact, and the 'PharmaVoice 100 most inspiring' – what were both of these incredible achievements for?

Both of these awards were a result of good networking and my "giving back" activities. Colleagues that I had helped in the past nominated me for my work in mentorship and career support for scientists plus being a leader at Addgene. I honestly can't remember how I was nominated for the Forty over 40, but it represents an effort to acknowledge women who are doing amazing things as their careers advance. There are a lot of "30 under 30" type lists and the founders of Forty Over 40 wanted to send a different message. We have a cultural emphasis on youth that leads to implicit biases disproportionately against women (think men with distinguished gray hair vs. grandma personas). The PharmaVoice award was initiated by two groups of women: women in the Healthcare Businesswomen's Association who I directly mentored or helped via the HBA Group Mentoring program (which I led for 3 years) and second, women in the Massachusetts Chapter of the Association for Women in Science which I founded about 11 years ago. It is the largest chapter in the nation and something I am very proud of. Organizations like ScienceOpen and Addgene are teaching scientists that sharing can have fantastic positive outcomes.

When did you first hear about 'open science' more generally? What did you first think of it all?

I didn't really know much about it until I started looking into the position at Addgene. I had just spent 20 years in Pharma and Biotech at quite a distance from academic science. The mission of Addgene spoke to my heart "Accelerate research and discovery by improving access to useful research materials and information." I have always been involved in pursuing collaborative projects and have often been stymied by materials not being available. It was not a leap to involve myself in this type of advocacy.

Why do you think it's important for researchers to be open about their research?

It is just a huge waste of time and energy to reinvent the wheel every time you want to start a study. We would be discovering more and doing it faster if we had more sharing of data and materials. Addgene as a case study has made this very clear. Moreover, the reproducibility issues in science make it even more important for studies to be reproduced and extended in different labs. Open science encourages this type of activity.

On the other hand, I spent 20 years in for profit science and I know what it costs to make life altering drugs. If no one makes money, no one will make new cures and bringing drugs to market is not something that is done well by academia. We need to find a way to protect intellectual property rights while making the science as open as possible.

What can researchers, industry, and non-profit organisations all do together to encourage a culture of sharing?

Share whenever possible and tell your colleagues you are sharing. There are so many benefits to depositing in repositories (more citations for example) that it is just paying it forward to get others on the bandwagon. Also be reasonable about sharing. It might not be reasonable to ask someone to share a mouse strain before publication that took two years to build, but it is reasonable to share plasmids because each one can make science go a little faster. Data sharing is the only way we are going to make progress on some very serious human diseases since humans are so diverse. I believe we have an ethical imperative to share human data for research.

Are there any potential downfalls to being open about your research?

Sure, but the advantages almost always outweigh the disadvantages.

Do repositories such as Addgene have a good uptake from relevant research communities?

Addgene was founded in 2004 by Melina Fan, a PhD student at Harvard at the time, her husband, Benjie Chen who is a PhD computer scientist and her brother, Kenneth Fan, who is in finance and business. I joined Addgene in 2011 replacing Melina as the Executive Director

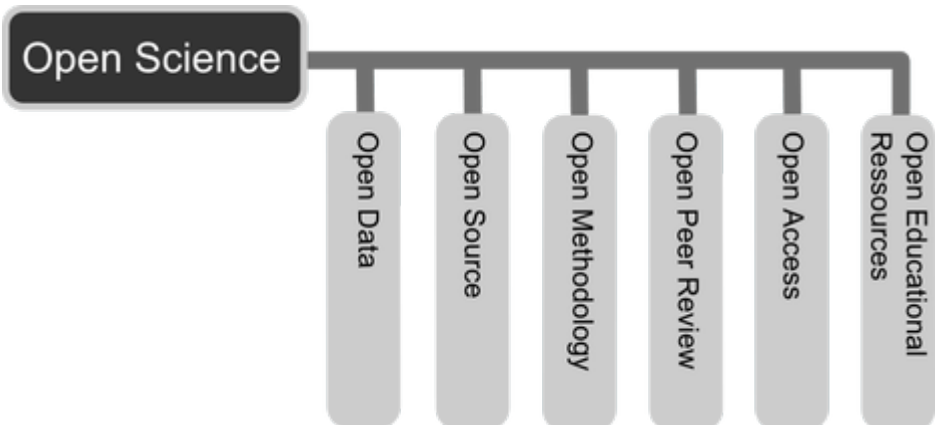


Figure 2. Open Science – so much more than just Open Access! (Source)

so she could concentrate on the CSO role she now holds at Addgene. They are amazing, forward-looking founders. . Here's our current stats (you can find some nice graphs of our growth in the literature). We have over 45,000 plasmids stored from >2,600 contributing labs in 500 institutions. We distribute over 500 plasmids each day to >5,200 institutions in 85 countries. This is a lot of sharing going on.

Do you think open science encourages broader collaborations within research?

We hear stories about this from our community all the time. Addgene depositors are sometimes surprised when other scientists request their materials. This sharing leads to new scientific relationships and unexpected information sharing. Scientists that deposit can also been seen as "thought leaders" in certain techniques by providing protocols and support via Addgene and via their own lab websites. This encourages other scientists to reach out with ideas, extend the data, suggest ideas to others in their community and add new technical features.

Do you think open science encourages or promotes increased diversity within academia?

Addgene works hard to distribute to scientists wherever they are. We are doing more outreach to Latin America and Africa because we know scientists there don't know as much about us. There are scientists everywhere, but they don't always have what they need. Open repositories can bring scientists from diverse communities together.

What can researchers, publishers, and institutes do to help promote a healthier and more diverse workplace within academia?

I have spent the last 20 years actively working on this issue for women in STEM and for other underrepresented groups including due to race, sexual orientation, disability and age. I will have to let my blogs, talks and content speak for themselves (you can Google me). Recently I am more often asked to speak about implicit (unconscious) bias and how this affects scientific hiring and career progression. I am currently planning a training workshop on this topic. Unfortunately, implicit bias training is not yet required in universities where so many scientists learn the habits of discrimination that they carry forward in their careers. Overt discrimination is a factor, but the thousand little instances of implicit bias that people are subjected to daily really deal the final blows. And don't get me started on outright sexual harassment. There can be no more silence or cover-ups about this. Too many good women have been chased from science due to predatory people in their fields.

One of the proven solutions to the challenge of diversity is the availability of strong, positive mentoring relationships. There are some fantastic advisors that are great mentors and there are some that are not. I think it is important for scientists in training to try to choose advisors that will serve as good mentors and seek out other mentors early and often. I support a number of scientist mentoring programs in the Boston area and I have published an eBook called Mentoring 101 for Scientists. The blogs and eBook also highlight peer mentoring as an important model for scientists in training. I hope more scientists will access and use these resources. I have the pleasure of "consulting" for scientist peer mentoring groups around the country and it is one of my most enjoyable activities.

How do you personally view the future of scholarly communication and publishing? And how do you see the role of data within this?

I like journals but I think given the current state of technology we could do much better at using them to accelerate scientific progress. The old fashioned, static, "print" methods section is one of the first things that could be updated. If a scientist deposits a plasmid at Addgene before publication, we hold the data until the paper comes out. Once the paper is released, the plasmid number in the Materials & Methods section is all that is needed to make sure scientists can see the details of the reagent even if those details are updated by our curation systems years later. Similarly, depositing protocols at Protocols.io and inserting the link in the publication instead ensures that a correct, updated protocol will be easily accessible. No journal will publish corrections for details like these and we all know that small errors lead to a lot of wasted time for scientists.

I also believe in the peer review process, but taking anonymity out of peer review is an important next step. I personally have seen this abused many times. If the scientific community were not under such stress for funding and if all scientists were 100% ethical, there wouldn't be a problem, but this is not true. I'd like to see more credit for validation (or non-validation) of previously published data so people doing this sort of work get credit.

Do you see open research networks such as ScienceOpen playing a role in this?

Absolutely. Organizations like ScienceOpen and Addgene are teaching scientists that sharing can have fantastic positive outcomes.

If you had to give one piece of advice to students interested in a research career, what would it be?

Start meeting people and developing diverse relationships from the start of your science training and keep it up through your entire career. Opportunities are all about who you know.

DANIEL SHANAHAN

Figure 3. Image credit: Daniel Shanahan

OPEN SCIENCE STARS: AN INTERVIEW WITH DANIEL SHANAHAN

Hi Daniel! To start things off, can you tell us a bit about your background?

I completed a Master's degree in Experimental and Theoretical Physics at University of Cambridge, but must admit I did my Master's more to have an extra year to play rugby for the university, rather than a love of micro-colloidal particles and electron lasers. I have always loved science though and found my way into STM publishing, albeit from a slightly less than traditional route.

What's it like to work at 'the original' open access publisher?

I love it! I am a huge supporter of open science and transparency, and BioMed Central had been a real game changer in so many ways, obviously with open access and open peer review, but also with many other issues around transparency, including publication of null and inconclusive results, pre-registration, publication of protocols and so on. The company is still determined to make science better and everyone who works here is incredibly passionate, so it is sometimes easy to forget that many people – possibly even the majority – still view transparency and open science with suspicion.

Figure 4. Gulliver Turtle! (Source)

The impact factor and the fact that it is so ingrained in our collective consciousness is a sign that we care less about the science and more about the headline – citations don't measure quality, they measure activity, which are not the same thing.

You recently published a paper with PeerJ about the Journal Impact Factor. What was your motivation behind this study?

I have been arguing that people selectively cite articles in high impact factor journals for years, not because the article is objectively better, or even more relevant to what they are doing, but simply because it is from a high impact factor journal. From my experience, researchers seem willing to take as given that articles in high impact factor journals are 'good', while other journals have to prove themselves. This is especially frustrating when, in some cases, the lower impact factor journals may in fact be objectively 'better' in some ways than the higher impact factor journals. This also goes a long way to explaining the impact factor inflation that's been seen, particularly in biomedicine. I simply wanted to demonstrate that this is what is happening – there have been a number of studies already linking citations to authors, publishing license and so on, but I wanted to show that, all else being equal, the article in the higher impact factor journal would be more cited, highlighting the absurdity of using it as a quality measure.

The idea for the study actually came as one of those 'I wish I'd said that moments', while I was waiting for my plane home and completing a Delphi study for an EQUATOR reporting guideline. I had just been presenting at a conference, and had got into a discussion (read 'argument') about this exact point, and realised that as the guidelines were often co-published across multiple journals that would provide me with a cohort to look into this and see if I was right.

The key finding of your study seemed to be that citations and impact factors are strongly correlated. What does this association imply?

Essentially it shows that researchers are unable to disentangle the article itself from the journal it's published in, and still believe that the journal impact factor is the final word regarding the quality of an article. If you want your article to be highly cited, regardless of whether it is any good or not, you are better off publishing in a high impact factor journal (although I doubt this comes as news to anyone). It also means that the impact factors for high IF journals are going to keep increasing, not because of anything they do or publish, but simply because of what they are.

If I were to be somewhat more controversial, I would suggest it is also indicative of the fallacy of 'quality' concerning a study's outcome. You could have the perfect study – flawless methods, conducted per protocol, well reported with the data available, and the likelihood is it would show nothing interesting. To my mind, this is good science. What is it not though, is interesting science (at least not necessarily). The impact factor and the fact that it is so ingrained in our collective consciousness is a sign that we care less about the science and more about the headline – citations don't measure quality, they measure activity, which are not the same thing.

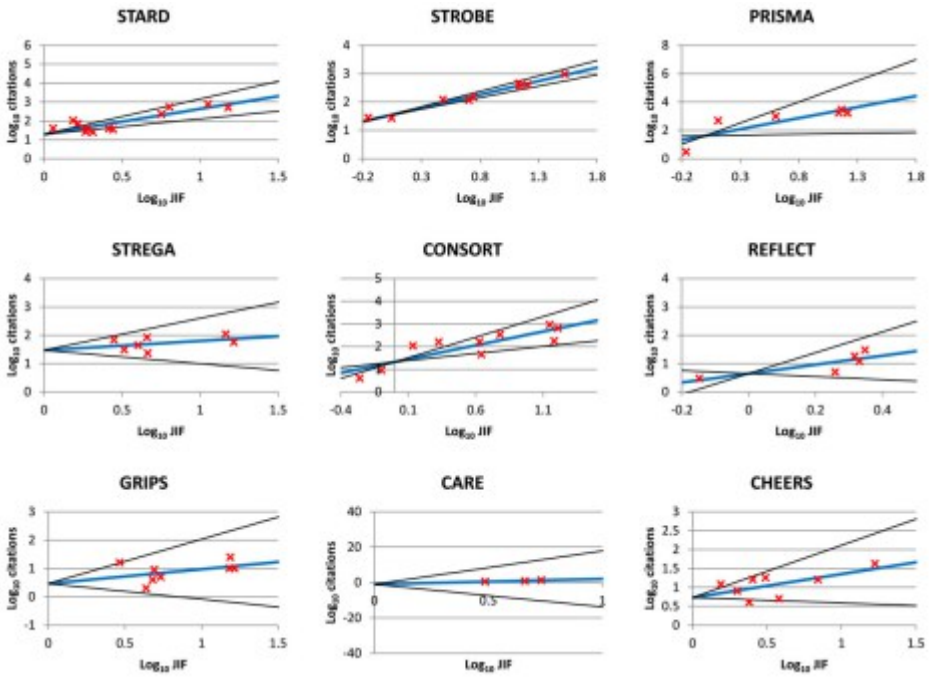


Figure 5. Linear regression fits for log-transformed journal impact factor and citations for nine co-published consensus reporting statements. (Source)

What impact do you think this might have on the use of impact factors in the future as an assessment tool?

Remarkably little, unfortunately. With this study, I have been able to demonstrate something many people have suspected for years. The thing is, even though we now know this to be the case, no one seems willing to change. Even those who are outspoken critics of the impact factor still play the game. I am in the fortunate position that my career is in no way dependent on my publications, so it is easy for me to point out the absurdity of it. For those in academia, so it is a more risky prospect. In order for anything to change, those at the top – both journals and academics – need to take the first step. But the game is working out well for them, so there's no incentive.

Why do you think research, as a culture, loves the impact factor, in spite of such widespread criticism?

It's easy. There's a longstanding joke that a researcher's primary aim is to read as little as possible, and impact factors allow them to do just that. They can use the journal impact factor to interpret the articles as high-quality and then ignore everything in a lower impact factor journal unless it forces its way to their attention. To be honest, this makes sense is a perverted sort of way, millions of articles are published every year, so you can't read them all and need some way to filter them. Until someone comes up with a better way, the impact factor will remain. What needs to change though, is its use in assessment.

Do you have any advice for junior researchers concerned about impact factors?

More sympathy than anything. There are two sides to these results and the one I'd really rather people didn't focus on is that the assumption that publishing in a high impact factor journal will get your article more cited seems to be entirely true. The advice I would give is simply to find the best journal for your article – many other things are correlated with citations, including the field of research and publication model (open access does significantly better than pay-walled articles, for example). Work out what 'success' would look like for you – do you want citations? Eyes on the page? Potential for collaboration? – and then identify the right journal for your work. Don't be afraid of going for a lower impact factor journal, as they might be better in the long run.

Figure 6. Image credit: Jorge Cham

Any thoughts on altmetrics as an alternative to the impact factor? Do you think these are good indicators of 'impact'?

I think it really depends on what you consider an impact factor as trying to do. They are a very good measure of the mean number of citations over a one-year period to articles in a journal published in the previous two years. What is not clear, however, is why that matters, or even what that means. Impact and quality are not the same thing; they're not even related – just read the Daily Mail if you want proof of the latter [*edit for non-Brits: The Daily Mail is a garbage tabloid published in the UK*]. The only alternative I am aware of is altmetrics, which provide a different view of 'impact', although these are just as clearly self-correlated. The main advantage of altmetrics is that they are at least at an article level, rather than a journal level, so whatever they represent you know that it's true for that article.

What can those in a position of leadership do to draw researchers away from mis-using impact factors?

They really need to lead. Senior scientists need to ignore impact factors when choosing where to submit, and when recruiting/promoting people. The big journals need to sign onto DORA (the San Francisco Declaration of Research Assessment) and stop using their impact factor for marketing. Funders need to stop considering impact factor when allocating funds,

and measuring output. In order for this to change, it needs to be top down, yet for some reason most of the discussion I see seems to be bottom up.

How do you see the future of assessment in scholarly publishing? What are the steps we need to take to get there?

I think an awful lot needs to change. I've actually written and spoken on this rather a lot, so am obviously very biased, but I think assessment needs to move away from the journal level and possibly even the article level. Science needs to be assessed at the study level – was it well designed and conducted? Can the study be repeated? Can the results be built on? Can they be replicated? A single study can lead to multiple articles, across multiple journals, which can make finding all the information like looking for a needle in a haystack. This is a symptom of measuring activity not quality.

Publishing and assessment need to change. Personally, I would like to see it move towards living documents, where all the information is recorded in real time – the protocol uploaded, the statistical analysis, full data and tools. This means that anyone looking to find out information about your study, or to use or build on it, has access to that information. It would also preclude some of the issues we currently face, like selective reporting, HARKing (hypothesising after the results are known), p-hacking etc. If we moved toward this, the concept of a journal would change, moving from somewhere that publishes articles, to somewhere that collates and curates research, sifting through the thousands of studies out there and building a collection, complete with readable research synopses. Then assessment would be based on the quality of the science, and publishing would allow people to identify and read what is relevant to them. Needless to say, we have a long way to go first though!

DR. GAL SCHOLNIK

Figure 7. Image credit: Merev Maroody.

OPEN SCIENCE STARS: AN INTERVIEW WITH DR. GAL SCHKOLNIK

Hi Gal! So can you tell us a bit about your research background, and how you originally got interested in science?

I did my BSc in Chemistry at the Tel Aviv University and my MSc at the Weizmann Institute, analysing the chemical composition of deforestation-fire smoke from the Amazon, where farmers and corporations yearly set hectares of rainforest on fire for agriculture and pasture. For my PhD at the Technische Universitaet Berlin I measured the electric fields at protein surfaces and self-assembled monolayers. Now I'm researching *Shewanella*, an electroactive bacterium that can transfer electrons across its outer membrane. As you can see, I always start on a completely new field, because my greatest passion in life is acquiring knowledge – so learning something new is my favourite kind of challenge. I'm basically just a kid who never got over the "why" stage, haha. Plus I had some very inspiring teachers at school – two wonderful women who nurtured my natural tendency to go deep in pursuit of answers to the hardest questions.

***Shewanella* is a pretty funky marine bacterium. Why did you choose to study it?**

During my PhD I was spectro-electrochemically investigating the electron transfer protein *cytochrome c*, and my group was collaborating with Dr. Falk Harnisch, who was researching electroactive bacteria. These bacteria display *cytochromes* on their outer membrane in order to respire insoluble electron acceptors. When Dr. Diego Millo from our lab told us about their collaboration I got immediately hooked and asked Falk if I could do a postdoc at his new group at the Helmholtz UFZ (Centre for Environmental Research). He was interested but had no funding, so we started looking for sources. At the same time, Dr. Marco G. Mazza, a colleague of mine from the TU, told me that his new group at the Max-Planck-Institute of Dynamics and Self-organization (MPI-DS) was investigating the collective motion of self-propelled particles. They were making models, but had no access to experimental data. So I put 2 and 2 together and created a collaboration between the MPI-DS and the UFZ. We took Dr. Niculina Musat from the UFZ on board too. She is the head of ProVIS, a platform for the chemical imaging of biofilms down to the single cell level. Thanks to her I had access to all sorts of fancy instruments, like the confocal Raman microscope I used for my latest paper.

You've published work based on research in Brazil – did you have to do any fieldwork/lab work over there? How was it, if so?

Back then I was in the group of Prof. Yinon Rudich at the Weizmann Institute, and we were part of a multi-national campaign meant to understand the connection between deforestation fires in the Amazon and the climate. I wasn't part of the sampling campaign. Rather, I chemically analysed the samples and later compiled a database from all the results of the different groups participating in the project. By asking the right questions I could use this database to constrain the optical properties of "elemental" carbon from biomass burning.

Figure 8. Electron micrograph of bac-Ministry Shewanella oneidensis MR-1. (Source)

I've only ever heard about *Shewanella* in the context of electrogenesis or microbial fuel cells – what's the deal there?

Well, at this point I should probably direct you to my new *Shewanella* Collection, where you can get a first glance at many of the things you need to know about this remarkably versatile respire, all open access. You could also watch the following video, where Prof. Kenneth Nealson, the man who discovered *Shewanella*, gives a pretty good overview on its past, present and future. But I will try to give you my version of it: Not many people, not to mention scientists, know that all living creatures on Earth without exception extract their life energy from the difference between the electric potential of their food's electrons and that of electrons in the end product of their respiration. Humans, for example, extract high-potential electrons from organic substances like carbs and fats and transfer them to oxygen to form water, where the electrons' potential is very low. The difference in electrochemical potential between electrons in carbs/fats and in water is what gives us the energy we need to exist. This is why if we stop breathing we die: no oxygen = nowhere to transfer the food electrons to = no life for us and for all the other obligate aerobes, i.e. creatures that need oxygen to survive. *Shewanella*, however, can respire either aerobically, anaerobically or both. There are many other creatures, mostly microbes, who can transfer their terminal metabolic electrons (i.e. the ones they extracted from their food) to soluble compounds other than oxygen, with a low-potential end product, allowing them to thrive in the absence of oxygen. Fewer are the ones, like *Shewanella*, who can not only do that, but can also transfer electrons extracellularly to insoluble electron acceptors. In nature they use iron or manganese oxides (e.g. rust) for that purpose. But in the lab, all you have to do is close them in an air-tight container with food and a positively charged electrode, and they start producing electricity. What they do is take the high-potential electrons from their food (they particularly like lactic acid salts) and transfer them extracellularly to the electrode, creating a current. Admittedly, this is not the best way for power production, as it greatly depends on the electrode's surface area and on mass transfer in the electrochemical setup. However, this is a great way to clean wastewater, because it allows bacteria that live naturally in the wastewater itself to consume

all the organic contaminants they find in it without the presence of oxygen. Since aeration is the most power-intensive stage of wastewater treatment, microbial fuel cells and other microbial electrochemical technologies (METs) offer a chance to clean wastewater without aeration and with greatly lowered sludge outputs while also producing a little electricity, or other added value products on the way. This can potentially turn wastewater from problem into resource.

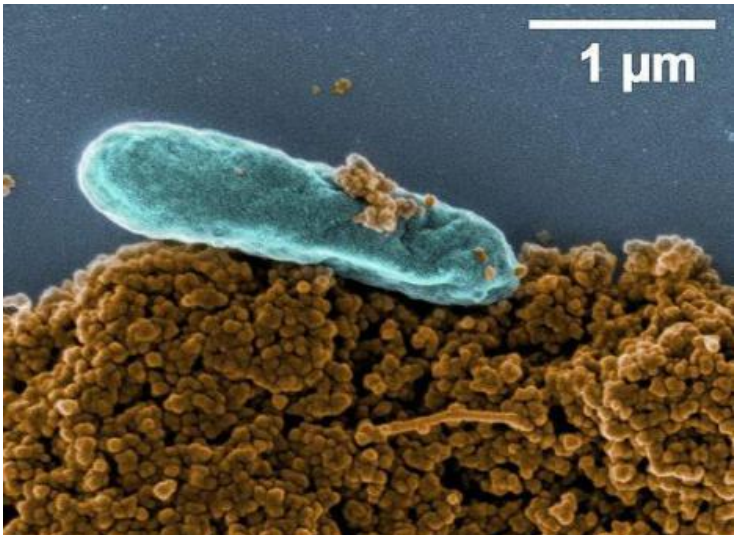


Figure 9. Electron micrograph of bac-Ministry Shewanella oneidensis MR-1. (Source)

Bacteria are tiny! Which methods do you use to analyse them? And what can you tell from these methods?

As part of the collaboration I have created, I had access to many different methods for investigating these tiny bacteria. Each of the partners had something to offer. In Falk's microbiology lab I could prepare my samples and perform videomicroscopy experiments. At ProVIS I had access to a confocal Raman microscope, which offers spatially resolved vibrational spectra, and to a scanning electron microscope, which can supply nanoscale resolution as well as elemental composition. About the outcome you can read in my latest PLoS ONE paper (Schkolnik et al. 2015). At the same time, programmers and physicists at the MPI-DS model the behaviour of the bacteria to investigate parameters affecting it. The nice thing is to be able to ask one question, get answers from so many different sources to it and then bring them all together to gain a much deeper understanding.

Any thoughts on open access or open science that you'd like to share with us? How have these thoughts changed throughout your career so far?

I'm a great believer in open access, especially when it comes to science. When you stop to think about it, there is no reason why tax-payers should fund both research and publication fees, and then have to pay again for access. Open access publication can be great for different kinds of researchers. For the selfish: open access publications get more citations, simply because more people can read them. For people who care: There is a huge imbalance in the world, with most resources concentrated in the hands of the few. Scientific publication is no different: the West is home to both publishers and the institutes that can afford their

subscription fees, while the rest of the world has to settle for crumbs. Open access as well as other online access and sharing platforms have suddenly allowed people not located in developed countries to access knowledge they could never access before and use it for their research. Think of all those researchers who can suddenly build upon existing knowledge and move forward. This can bring to a huge boom in science, just like the economic boom experienced by the accepting countries of immigration waves.

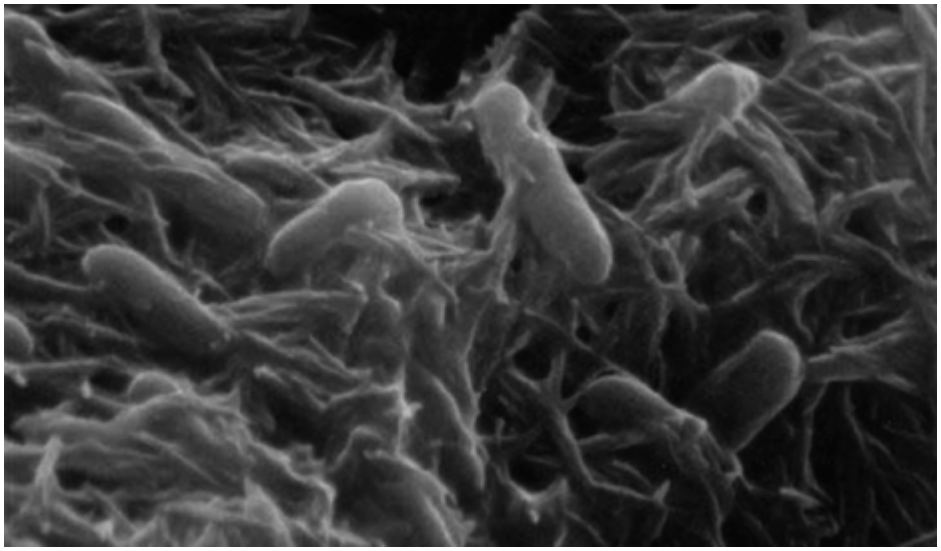


Figure 10. Shewanella oneidensis (Source)

About my personal open access history: Two of my most cited co-author papers were published in Atmospheric Chemistry and Physics, an open access post-pub model journal, and now that I can make my own decision where to publish, I went for PLoS ONE with my first *Shewanella* paper. Any paper I publish with my physicist collaborators will surely be posted in arXiv first.

How important is data, paper, reagent (etc.) and code sharing in your field?

Very important. It's very common to get an email from colleagues asking for a paper they don't have access to, to ask the next door lab for reagents or equipment I might need, and to share equipment and reagents within the group and among collaborators. It saves a lot of time and money and it also strengthen ties within the community. When you lend equipment, you may ask what it's for and get involved in a new collaboration. And if someone asks you for paper access you may end up reading it and discover something you were not previously aware of.

Why did you decide to build a ScienceOpen Collection on *Shewanella*?

My motivation was twofold: firstly, I wanted to support ScienceOpen as a platform that helps make science more accessible and up to date. I think Collections are a great way to get the word out and inform more people about it, so they can benefit from all that it offers. Second, I think that Collections on ScienceOpen are a really great way to give readers a quick overview of a certain field, and in my collection I made sure they were only papers that can

be freely accessed by anyone. This means that anyone who is new to these bacteria, like a student or like me three years ago, gets an initial literature list they can actually open, read and gain an initial understanding of this remarkable creature. Every paper has a little comment where I explain why I thought it was important, so that readers can also choose what to read without going through the whole abstract.

How do you hope this will affect future research on this topic?

It's hard to make such predictions, of course, but I hope it will facilitate the integration of new young researchers into the field. Another welcome outcome would be if people who have no access to journal subscriptions can use ScienceOpen to gain more knowledge about electroactive bacteria and their possible applications. I am sure there is a pretty good geographical correlation between people who have no access to paywalled publications and those who could really use a little wastewater treatment facility in their neighbourhood, where they can also, say, charge their mobile phones.

What are your future plans for research in this field, or is that top secret?

Unfortunately that is top secret, but stay tuned for at least a couple of further publications in the near future. A secret that I can reveal already is that I am slowly planning my next career step. It has to be in a Berlin-based organization aiming at making our world better, so if you are a recruiter for one of those, please feel free to contact me.

What is the single most important change in scholarly communication these last few years?

I think the gradual demise of print publication is a very important process. Many young scientists and definitely many students have never read a printed journal in their entire career, which makes subscription fees even more redundant than ever. Just as music has become much cheaper once you could just record it at home and download it, because there were suddenly no production and distribution costs, I believe the current business models, designed for bricks-and-mortar libraries are pretty much doomed. This of course has also made open access publication possible.

How do you envisage a future of science communication and publishing?

I think eventually there will be no print, hardcopies or subscription fees. The scientific community will have to find its way to full online, open access content, and just move with the times to a world with more equality and therefore more and better science. In the age of internet it is high time we got over geography, and I am also hoping that governments will start demanding open access publication of the research they help funding.

ISRAEL BIMPE

Fig. 11. Image credit: Israel Bimpe

OPEN ACCESS IN RWANDA: THE STORY OF MEDICUAL STUDENT, ISRAEL BIMPE

Hi Israel! Could you tell us a little bit about your background?

I'm a Pharmacy Student at the School of Medicine and Pharmacy of the University of Rwanda, doing my final year, which is just an internship, and very excited to graduate in July. I'm also a youth role model and champion for global health issues as the Vice President (and Chairperson of the African Regional Office) of the International Pharmaceutical Students' Federation.

When did you first hear about 'open science' and 'open access'? What were your first thoughts about them?

I heard about Open Science and Open Access during the 68th World Health Assembly in Geneva where I met a friend who was calling for more Open Science and Open Access in a random hostel lobby group discussion. It was so interesting that I got to check about it and even registered for the conference in Brussels (OpenCon), for which I was unfortunately not selected due to my limited knowledge probably.

You are very passionate about global health equality and social justice. Where do you see open access and open science fitting into this?

I have been thinking about ways of linking up my passion to my interest in Open Science and Open Access, but still struggling to bridge them. I feel like my passion is more of civic engagement and interest on open science and open access more into education and science.

Figure 12. Rwanda! (Source)

Moreover, I rarely read/hear my Global Health and Social Justice Role model refer to Open Access and Open Science. It is quite still confusing for me.

How important is open access to students and medical professionals in Rwanda?

This not only applies to Rwanda but Africa in general in order to advance education and science, we need to access recent and up to date information. A practical example is that, I, in my whole education never used a paper published in the past two to five years. Excuses are usually that it's expensive to access them and how easy it is to access the platforms. Open Access would then be very important for students and medical professionals here in matters of accessing updated and accurate information, as well Professional Development for a better practice.

Figure 13. Israel raises the Rwandan flag after he was elected chairperson of IPRF-Africa Region (Source)

Do you and your colleagues from Rwanda struggle with getting access to research?

We do struggle very much, as we can only access very old, non-accurate research. The same research is not extended to the student level. My University, for example, only considers it a priority for postgraduates only. Hence they do not put in place facilities needed for me and my colleagues to access it. I guess it's because it is also a struggle at all levels regardless of the degree level.

What is the current state of Open Access in Rwanda? Is it easy to publish via this route?

Open access in Rwanda is limited to the law on access to information from the government, which is not scientific at all. Moreover, very few of us are informed about the basis of Open Access. I wouldn't say if it's easy or not. Open access is a gospel which is yet to reach us.

Does 'open science' work as a system in Rwanda? Are there policy initiatives and research-led projects working together?

We are a very young research-wise, and hence have not yet explored the Open Science side of it.

What are some of the best ways you've found of encouraging students to be 'open'?

Students are not very involved in research. Hence being 'open' is quite irrelevant to them.

What are the main barriers to open science and open access in Rwanda?

The research environment and capacities lacking very much and while struggling for relevancy, the few researchers we have won't aim for open.

Could platforms like ScienceOpen help encourage researchers in Rwanda to be more open about their research? For example, through open peer review?

Yes, definitely.

How do organisations like the Rwanda Pharmaceutical Students Association and the International Pharmaceutical Students Association engage with policymakers about issues regarding open science?

I will speak more on the International Pharmaceutical Students' Federation, through our Pharmacy Education portfolio, though not yet explored, I believe we can make a step further, include Open Science in our strategic plan and through advocacy call for Open Access in order to maximize all advantages that come with it. As well always say it should make medicines for people and not for profit, I would also say make research for people and not for profit.

If you could change one thing about scholarly communication, what would it be?

Speaking for an aspect of studying in Rwanda, so different from elsewhere, we need publications to be really accessible to us. Consider matters like no or slow internet, limited electricity, among others. And then look at the process to access updated scholarly materials.

Where do you see the future of scholarly communication, in Rwanda and more broadly? What steps are needed to get there?

In Rwanda, and Africa, we will still lag behind for many years if we still depend on research made abroad and making less of own. Broadly, it worries me when I look at how expensive it

is to access the necessary scholarly materials, it is limiting access for all in less developed countries and even making it harder for those in developed countries. Scholarly communication has to be more open and accessible. Steps would be to change the way research is funded, as the trend is now is do the research that can be funded not the one that is the most relevant or interesting. Then make it for people and not for profit, ease the access for all, consolidate research education and build more open platforms.

If you could give one piece of advice to students wanting to pursue a research career, what would it be?

Start as soon as you first feel that interest. Start as early as yesterday.

IARA VIDAL

Figure 14. Image credit: 20/20 Fotógrafos Associados studio

OPEN SCIENCE STARS: IARA VIDAL

Hi Iara! So can you tell us a bit about your background to get things rolling?

Sure! I had my first experience with scientific research in high school. I was in what we call a "technical school" here in Brazil, studying to be a meteorological technician. In 1998 me and some other students did a study correlating rain levels with the incidence of certain diseases whose transmission is somehow related to water. It was great fun to go looking for all the data we needed, and we actually got a poster accepted at the 10th Brazilian Meteorology Conference (pdf is available here, if you're curious and can read Portuguese – there's a short English abstract but that's it). That was my first scientific event – and honestly, conferences are probably my favourite aspect of academia to this day. For college, I changed from Meteorology into Library Science. I joined a research group in my university and kept presenting papers in small scientific events and student meetings. It was an amazing experience, but when I graduated in early 2005 I decided to go work in libraries instead of staying in academia. I *love* being a librarian, but things became difficult when, through reasons that are too complicated to explain here, I ended up as the sole librarian in a federal agency. Much as I tried, I could not improve my situation. So, in 2012, I decided to leave and pursue an academic career. I got my master's degree in Information Science in 2014, and have been working on my PhD since 2015.

When did you first hear about open access and open science? What was your initial reaction?

I think I first heard about open access in the early 2000s, maybe in one of the Library and Information Science student meetings I used to go to. But it was only in the past few years that I got more involved in the issue. In 2013 I attended a conference celebrating the 15th anniversary of the SciELO Network (http://www.scielo15.org/en/about/), which got me really excited not only about open access, but also about the role of Latin America and other peripheral regions in all this. As I researched more about open access I got to know about open science as well. My reaction to all this was of excitement (hell yeah let's free knowledge!), but also questioning: how do we get people to change their behaviour? I think the answer lies in incentives, which increased my interest in research evaluation. I studied altmetrics in my master's and am now moving to article-level metrics, but the end goal is improving evaluation.

How important do you think open access and open science are to researchers and students?

I think it is much more important than most realize. I don't think anyone would deny that access to information (not only finished articles, but also data, instructions, software and so on) is essential to science, but many don't realize that not everyone who needs access has it. Even if we believed the general public can't understand research (which I don't), there are lots of researchers out there with limited resources that need to make an impossible decision between buying access or investing in research. As a community, we need to address that, and I believe being open is the way to go.

You work a lot in the field of altmetrics. Why do you think these are important for researchers?

Altmetrics can help us better understand the impact of our work. Who's reading it? Who's sharing, and why? Like any other metric, they can't tell you the whole story (not every activity around scholarly outputs happens publicly in social media), but they do pick up a lot of things that were simply invisible before.

Do you think altmetrics serve different purposes between peripheral and central countries?

This question is so important to me that it is one of the central issues in my PhD research! We know, at least since the 1980's, that international journal databases include a very small portion of journals from peripheral regions like Latin America. This has important implications when trying to use them to evaluate authors from these regions. If the sources used by altmetric providers include only media in English and/or from central regions, they will face similar problems. So, it's not that altmetrics serve different purposes between centre and periphery, it's just that, if we're not careful, they will show a distorted picture of everyone in the periphery, as traditional metrics do.

How do altmetrics fit into the bigger picture of open science? Where do you see the future of altmetrics in an increasingly collaborative, transparent, and open research environment?

As we're making efforts to open up science, it makes sense to measure not only the influence of a work inside academia, but also outside: into professional practice, education, policy-making, and the public opinion. Article-level metrics (or even better, output-level metrics), which combine citations, social media mentions, usage statistics and more, can be very useful for that.

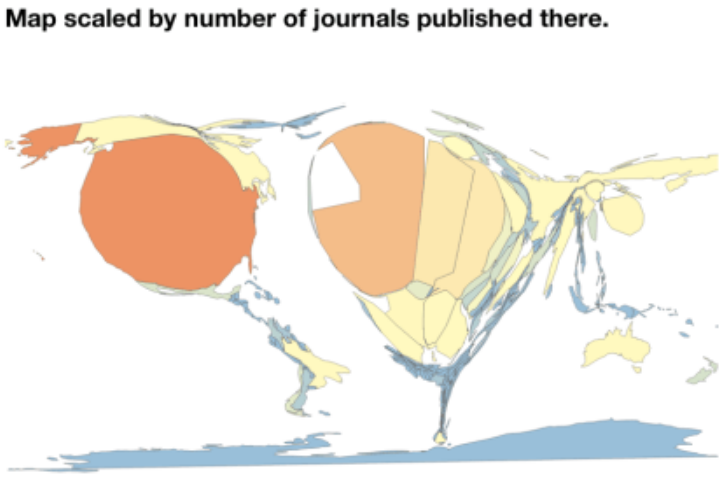


Figure 15. Credit: Juan Pablo Alperin (CC BY)

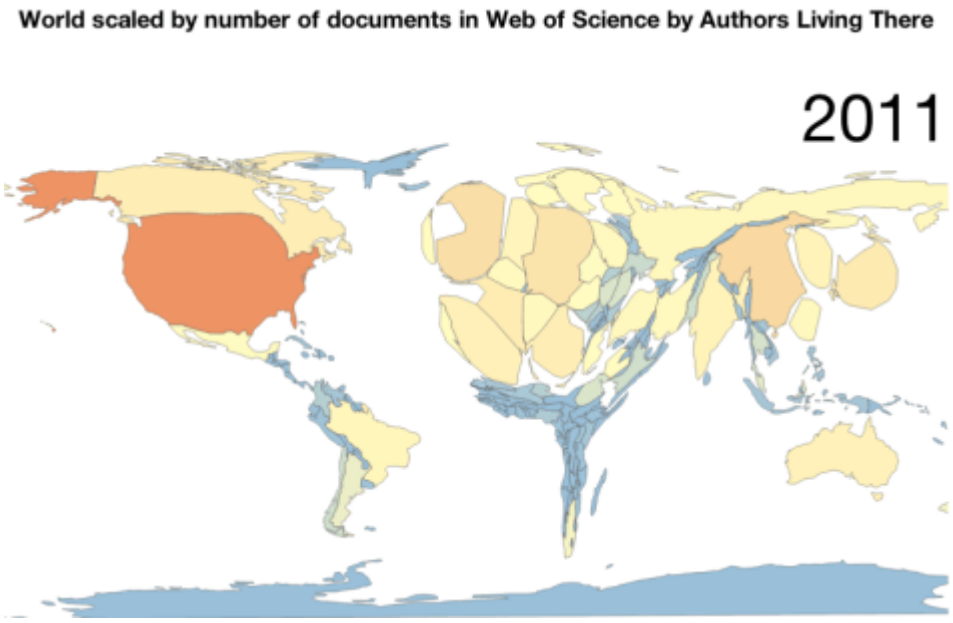


Figure 16. Image credit: Juan Pablo Alperin (CC BY) (Source: Figshare; interactive version via GitHub)

Are altmetrics superior to other metrics like the journal impact factor? Or are they different beasts entirely?

Figure 17. OpenCon 2014 group photo. Credit: Aloysius Wilfred Raj, CC BY.

First thing we need to realize is that altmetrics is not a monolith. The journal impact factor is a single number. Altmetrics are a bunch of different numbers that have lots of different meanings. Now, there are attempts to distil altmetrics into a single number (like the Altmetric score or Mike Taylor's Less Wrong Metric), and they have their value. But what makes altmetrics interesting to me is exactly their heterogeneity. And this actually applies to all metrics. Even citations don't have a single straightforward meaning, because there are many reasons to cite. I can cite one paper to contest its findings, and another to signal to my reviewers that I am aware of important work that has been done in my field. So, when using metrics to evaluate the importance of a work, a person, or an institution, it is crucial to understand that research can be used in many different ways, and that it's very hard for a single number to account for all of them.

Do you think things like the 'sort by altmetric' function on ScienceOpen are useful?

One of the uses of altmetrics foreseen by the Altmetrics Manifesto was exactly as a recommendation tool. Even with my reservations about the Altmetric score, I was very curious about the "sort by altmetric" function when it launched. We will always need filters to help us navigate the scholarly literature, and altmetrics can point you to what is "hot" in your community right now. It may be an unexpected finding, or something that needs correction. But it can also be useful to look at the bottom, at the papers that for some reason are not getting attention. If we let go of the notion that attention equals quality, we can see that are lots of interesting things out there waiting to be discovered. For instance, I looked for "scientometrics" (the study of measuring and analysing science, technology and innovation) and sorted papers from low to high altmetric score, just to shake things up. Curiously, first paper in the list (meaning, the last one by altmetric count) was authored by two Latin-American women and analyses research in a neglected tropical disease – almost an underprivileged combo!

You've attended OpenCon last year (yay!) What do you think the role of the OpenCon community will be in the future of scholarly communications? What do you think it says about the state of research around the globe that such communities even exist?

OpenCon is easily one of the top 3 things I've ever been involved with. I truly believe members of this community will be leading the change in the scholarly communication system. One example of this was the "Defining the Scholarly Commons: Reimagining Research Communication" workshop that Force11 held last February in Madrid. The workshop united experienced and early-career researchers as well as students like myself in a thought exercise to reimagine scholarly communication. I think most of the students and early-career researchers there were OpenCon alumni. Of course this happens because being part of OpenCon made us more visible, and that's why the inclusiveness of OpenCon is so important. I see a real concern inside the community to empower people so they can make a difference where they are, at the same time that they contribute to a global movement. That's a lot like the scientific enterprise itself: it is (or should be) about building universal knowledge AND solving local problems, not neglecting one for the other.

What is it like being a researcher in Brazil? Are scholarly communication channels well-established? How difficult is it to access the literature for you and your colleagues? And how difficult is it to publish Open Access?

First, a disclaimer: I have studied a bit about these issues, but my views are heavily influenced by the field I'm in (by the way, Library and Information Science are among the Applied Social Sciences over here). Things might be different for fellow Brazilians working in other disciplines. The typical Brazilian researcher is employed by a public university or research center (some private institutions do research as well, but it's less common). Scholarly communication practices are influenced by the evaluation criteria enforced by funding agencies, which includes a journal ranking named Qualis. As it happens in other countries, we're judged by where we publish. Qualis criteria vary according to discipline, but "international" (English-language) journals with high impact factors and/or indexed by an

international database are often in the top tier. So, that's where we're all trying to publish. We do have our own journals, mostly hosted by universities and societies and getting their funding from them and/or from agencies. They are usually free to read and free to publish (I can't remember any paid Brazilian journal, but again, I might biased). Based on this, and knowing Brazil is the home of the SciELO Network, one of the first open access initiatives in the world, you might think Brazilian researchers are passionate OA advocates. That's not quite true. Open access was pretty much a survival strategy for our journals – they wouldn't get many users willing to pay for subscription. The federal government pays for a bunch of subscriptions from some big international publishers, which are available to students and researchers in public universities and research institutes (and some private ones). I believe this helps to keep the OA issue away from Brazilian researchers minds, at least until they really need that one article they can't find in the portal.

If you could change one thing about scholarly communication, what would it be?

I would love to get rid of the notion that evaluation is supposed to measure and reward quality. I think it would be much more useful to consider evaluation as a tool to change behaviour and promote desired outcomes. When you know the criteria used to judge your performance, you will do all you can to meet these criteria. This is something we can use to our advantage. We should reward open access not because of "quality" (there's plenty of great papers behind paywalls), but because we want our publications to reach as many people as possible. Same logic should apply to funding allocation: it is not simply about rewarding who did a good job, but finding where the weak spots are and what can be done about it. Of course I'm not against recognizing merit, but we need to consider that you can only get so far without proper resources. It may be that some researchers/institutions/countries/regions don't advance because they're simply not good enough, but I'm willing to bet that the problem in most cases is not ability, it is lack of resources. If we keep rewarding the "good" ones and punishing the "bad", the divide will get bigger and bigger (what we call the "Matthew Effect") and it will become even harder for the "bad" ones to improve.

If you could give one piece of advice to students wanting to pursue a research career, what would it be?

The most important lesson I've learned so far in my life: it is ok to take detours, to change paths, and even to give up when things stop making sense to you. I began in Meteorology because a private high school was too expensive for my family's budget while a public technical school meant quality education for free. I went to Library Science because it aligned better with my interests (have you seen how much calculus is involved in weather forecasting? Too much for me). The research group I was in during my undergrad had a focus in Linguistics. I graduated and got a job as a librarian in a health-related government agency. At some point I started a bachelor's course in Theology, but abandoned it halfway. When I realized my job was doing me more harm than good, I gave it up and got back to academia. I'm currently in love with scholarly communication studies, but who knows, this might change too. Yes, my meteorological technician certificate is pretty much useless now, and I forgot most of what I once knew about ontological metaphors. Yes, if I had stayed in academia instead of spending

6 years of my life in a job that ultimately made me miserable I would most probably be a PhD and even have a stable (as in, for life) teaching job by now. But the skills I got, the experiences I had, the people I met, the things I found out about myself, none of that was a waste. So take your time and don't be too hard on yourself.

ERNESTO PRIEGO

Fig.18 Credit: Ernesto Priego

OPEN SCIENCE STARS: ERNESTO PRIEGO

Hi Ernesto! Thanks for joining us here. Could you start off by letting us know a little bit about your background?

I was born in Mexico City. I am Mexican and I have British nationality too. I studied English Literature at the National Autonomous University of Mexico (UNAM) where I also taught and was part of various research projects. I came to the UK to do a master's in critical theory at UEA Norwich and a PhD in Information Studies at University College London. I currently teach Library and Information Science at City University London.

When did you first hear about open access and open science? What were your initial thoughts?

I cannot recall exactly. I think I first encountered the concept of 'open access' via Creative Commons. I was a keen blogger between 1999 and 2006, and I remember that around 2002 I first came across the concept of the 'commons'. I think it was through Lawrence Lessig that I really got interested into how scholarly communications were incredibly restrictive in comparison to the ideas being discussed by the Free Culture movement. Lessig's *Free Culture* (2004) changed things for me. (For more background I recently talked to Mike Taylor about why open access means so much to me in this interview).

You run your own journal, The Comics Grid – what was the motivation behind this?

Realising how difficult and expensive it was to access paywalled research got me quite frustrated with scholarly publishing. When I was doing my PhD I just could not understand why academics were stuck with a largely cumbersome and counter-intuitive system. The level of friction was killing my soul (it still does). It just seemed to me (now I understand better the larger issues) there was no real reason to not start your own journal as an academic, to regain control of our own work and to create, disseminate and engage with scholarship in a faster, more transparent, fairer way. I've said before that often scholarly publishing feels like that place where academic content goes to die: the end of the road. I feel publishing should be a point of departure, not the end.

At the time (around 2008, 2009) I really believed we needed rapid publication; in many fields scholarship was already obsolete by the time embargoes had passed. Having studied in Mexico also gave me direct experience with the high cost of international scholarly publishing and the negative social and financial consequences that the disparities in access to knowledge had at a global level. It was coming to Norwich in 2002 that opened my eyes to how privileged university students and academics were in the UK in terms of access to resources through their libraries (I know this is not equal across the board within the UK).

I wanted to make my own small contribution to a change in the scholarly communications landscape by getting a group of colleagues together and starting a journal from scratch. Luckily Ubiquity Press signed us up in 2013 after two years of hard, rapid collective work using a WordPress platform. They taught us and helped us do things properly. The transition to Open Library of Humanities (OLH) in 2015 was a dream come true because OLH was

exactly the kind of platform I had been imagining we had to build in the arts of humanities to adapt to the 21st century successfully. My editorial for our first issue under OLH can be read here.

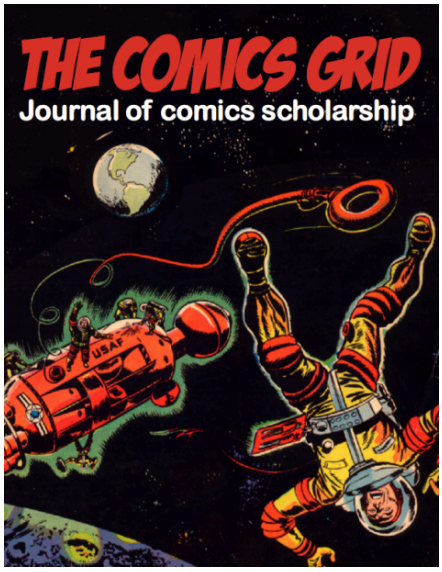


Figure 19. Credit: Ernesto Priego

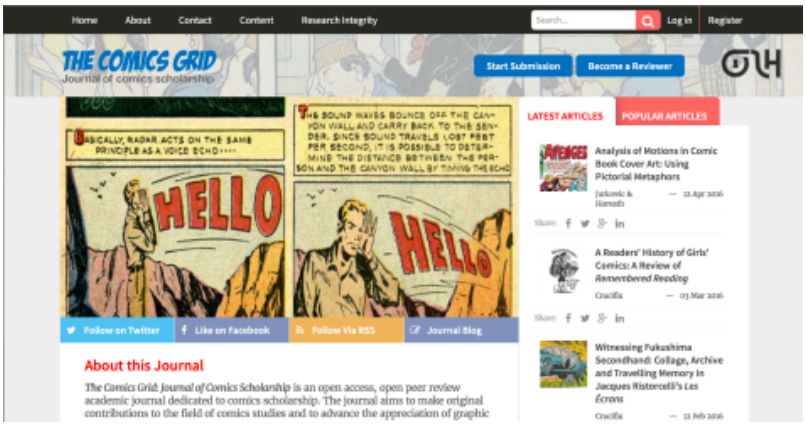


Figure 20. Credit: Ernesto Priego

As a lecturer in library science at City University London, how often do discussions about open access come up?

Very often. Open access and open data are key components of the lectures. I have covered OA in both the Digital Information Architecture and Libraries and Publishing modules I've taught, and students have written blog posts, final essays and dissertations about the topic (I know different aspects of OA are also covered by my colleagues too). I have also invited open access researchers, publishers and institutional repository managers to give talks to the students. I think librarians and information professionals are key stakeholders in the transition

to open access. A critical understanding of the scholarly communications landscape, of the needs of researchers, of the technologies involved in scholarly publishing and assessment, of methods of metrication and of licensing and intellectual property are some of the key LIS skills that are the bread and butter of open access publishing and research data management.

Do you find that students are generally more or less receptive about open science than researchers further in their careers?

That's a good question. I don't know if it's possible to generalise. Personally I am slightly disappointed when PhD students and/or junior scholars feel they need to 'play the game' and opt for (or feel they have no choice but) doing things the way they have always been done in order to further their careers. I understand why this happens, yet it may be that when I was young I identified with punk and DIY cultures and I still feel that youth is a time to think and act creatively in order to push social boundaries.

Coming back to OA, I guess one can always find an excuse, at any career stage, to not embrace greater openness. The thing for me personally is that open access is not just about technical infrastructure (no paywall) or licensing (some rights reserved instead of all rights reserved) but based on principles of reciprocity, collaboration, trust, equality, transparency and the social good. And the truth is that most scholarship within the current economic and political context today encourages selfishness and secrecy. People are afraid of getting their ideas stolen, of missing out from getting that grant, that job or that promotion. It's understandable. Of course it is.

Figure 21. Credit: Ernesto Priego

There is also real, explicit pressure from universities. It seems to me universities themselves are in fear of assessments like the REF. Against openness there is a fear of missing out (on funding, on rankings, on reputation, on student satisfaction, on citations, on intellectual property). There is fear everywhere. I think what we should fear is the lack of transparency and the misplacement of our educational objectives. Scholarship has been largely distorted in some contexts to become mostly about competition, and not about collaboration.

Open access implies that people will want to share and that people will respect each other. This does not always work in reality because the culture in most places and contexts is not yet ready for that. So of course younger academics, students and junior faculty are afraid. I *am* afraid.

Some critics of open access have said some open access 'advocates' are moralists, but I don't think openness is about morals but about teaching, research and citizenship ethics. This does

not mean that publishing non-open access is unethical– it means that one has choices, and choices have consequences and these choices create and establish modes of behaviour. We cannot complain about a system while perpetuating it forever claiming we have no choice.

Much discussion about open access has focussed on its role in STEM publishing. Do you think OA in the humanities should be treated differently?

No. I am acutely aware of important disciplinary differences though. I understand why some colleagues in STEM are happier to go for CC-0 than their humanities counterparts for example. But I don't think that the arts and humanities should be treated differently in terms of licensing, even when we work extensively on third-party content (there are provisions for that). If CC-BY is good enough for famous, successful artists, it should also be for the most ego-driven and possessive of humanists. All Rights Reserved, like all unreasonable prohibitions, only leads to friction, resentment and rebellion.

Figure 22. Credit: Ernesto Priego

Why haven't we seen something like the Open Library of Humanities emerge for STEM yet?

I am part of the LibTech committee and I am therefore biased; I think it's the right way to proceed in the current context. Importantly it is a researcher-led, legal, sustainable model. I think it is fair to say that the OLH was partly inspired by PLOS, so I think normally the question is why open access in the humanities hasn't progressed as much as in STEM. (One reason is funding differences, but also the way authors relate to what they do).

I believe people still appreciate journal titles as 'brands', for what they represent, but at the same time I think that in the future we will see more appreciation for the article as an output in itself, i.e. not judged by the journal in which it was published. 'Reputation' will be author-level and/or article-level. This is already the case in practice amongst some scholarly circles. If an author you respect or if ideas that are valuable are presented in a platform that's what matters in practice, not the brand of said platform (research assessment officers might disagree). This means we will be able as readers/researchers/students to create our own collections. This is already happening as you know. It's the way we do research today. That's the knowledge being unbound there– researchers are curators and as such we need platforms that are freely and openly available and accessible, that are modular and subject to annotation and review.

We need platforms that challenge pre-established categories and disciplinary boundaries. They already exist; they just need the backing of more of us and the recognition from those who assess and have the power to change culture more rapidly by paying attention to how 21st century researchers are working. As to why we don't have an OLH for STEM as such it might be because STEM communities haven't felt they need it yet.

Do you think we'll see more of these 'library consortium'-based publishing models in the future?

I think so, but predicting the future, though we all do it up to a certain extent, is always a failed experiment (we learn from failure and negative results too though). Maybe funders' consortia, or even professional associations' consortia could help support libraries in their role enabling access to scholarly/scientific publishing. In my view it is not fair to place all the onus on libraries. We know where that took us in the past. This does not mean I don't think we will see more libraries doing their own scholarly publishing through repositories and overlay journals. I think, or hope, we will.

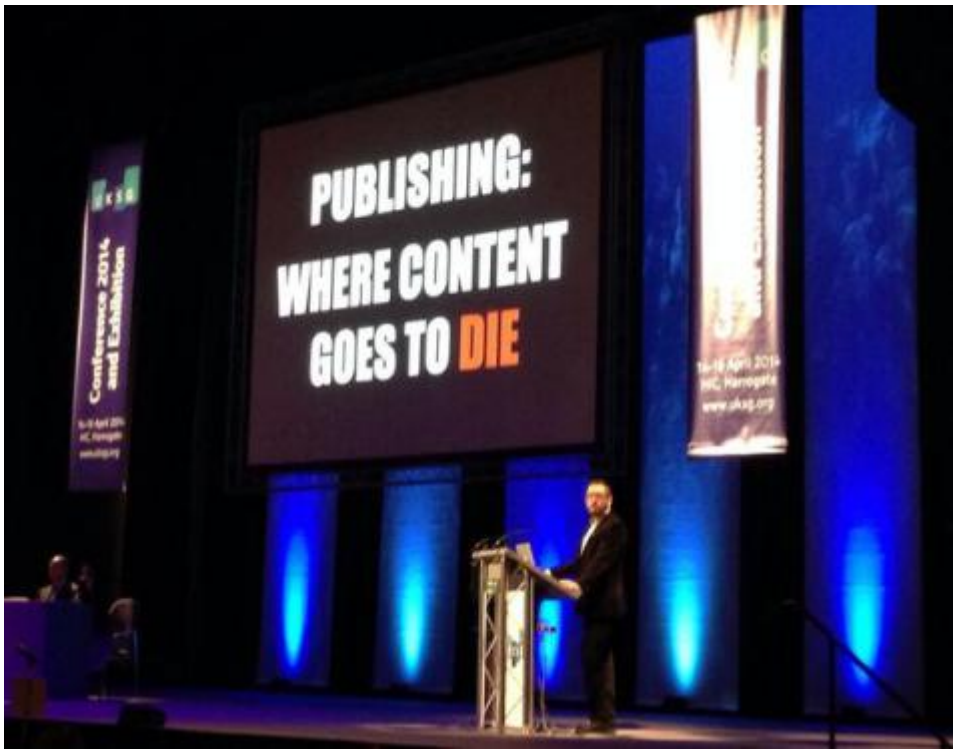


Figure 23. Credit: Penny Andrews (used with permission)

What do you think is needed to create a real marketplace for open access?

The monopolies need to be challenged. Elsevier and Thomson Reuters hold too much power. The synergy between the published journals and the systems of indexing, ranking and assessment need to be interrogated and conflicts of (financial, political) interest need to be unveiled. We need pricing transparency from the major publishers, and transparency in the way research publishing funding is allocated. Double-dipping needs to be eradicated, and APC and individual access prices need to go down to allow most researchers and readers, funded or not, from within a library or not, to afford it.

Gold OA needs to eventually become the default- for this publishers need to be transparent, accountable and fair, and reputation and publishing cost should not be seen as equivalent. Publishing costs money, it does. It cannot be free to everyone. Most serious open access advocates know this. The money exists and there are fair and transparent ways of sourcing it. We also need to abandon negative prejudices and myths about APCs being equivalent to vanity publishing. Paywalled publishing is also paid by authors, just in a different way. "We need we need we need." It becomes tiresome…

Do you think open access and open science have the potential to change how we think about research assessment?

Completely. First of all ideally it means that one believes publishing is about contributing to knowledge, to communities of practice and the public, and therefore the goal of publishing becomes advancing the pursuit of knowledge, not one's career. 'Publish or Perish' translates the tautology of a practice: publish not to be read and discussed, but to have something published that can get you promoted.

The greater popularity of platforms like Academia or ResearchGate in comparison to institutional repositories shows that academics appreciate good user experience but also that they want to share even if they are not allowed to do it legally. So they are making otherwise-embargoed paywalled papers available on those networks against the licensing conditions they signed. To me this highlights that some academics do want to share but do not really know how to do it legally and/or are not being encouraged and supported to embrace open access. Open access is the legal, sustainable way to share what you do in a way that can also get officially recognised. OA is about achieving both things, to have peer reviewed research sustainably published that can also get you promoted. Because information is openly accessible and reusable, it can be assessed more transparently and by more people. In this sense it is the community, specialised colleagues, the public, the media, who is able to assess outputs. Not just those who have the keys to unlock it.

OA also enables faster metrication, that though never neutral and requiring always qualitative context, it offers us ways of getting new insights into how research is being shared and commented online almost immediately. I see this as a good thing that can complement current (not perfect) methods of assessment. But I think this pervasive culture of assessment, as currently officially implemented, is generally quite destructive. It turns researchers into competitors and gatekeepers. Peer review as a mechanism of quality control is in essence a good thing, but it can be done more transparently, more fairly, more quickly, with greater recognition for those who do it and essentially as an ongoing process (open post publication peer review). Once again it is about working towards a type of scholarship which is about learning from each other, not about surveillance and gatekeeping.

What can 'open advocates' do to help others overcome the potential 'fear of open'?

I think those who are working in and for open access can help colleagues realise that what we should fear is continuing doing things the way we have always done them. We need to think about the greater good, not just about ourselves as individuals.

Where do you see the future of scholarly communication? What steps are needed to get there?

Aye, that's the rub. I see it online, in mobile devices, enabling quick sharing and open post publication peer review. I see reviewers and editors being rewarded institutionally for their work as open peer reviewers and authors being rewarded for publishing open access outputs enabling colleagues and the public to reuse their work in imaginative and productive ways. In the future I'd like to see more diversity, in every way, and less divisions, less gatekeeping. But this is an ideal vision of the future. Reality bites.

Whose responsibility do you think it is to lead this change?

All of us must lead. Funders like the Wellcome Trust are leading the way. Publishers and repositories like Figshare, Dataverse, Ubiquity Press, Open Library of Humanities, The Winnower, F1000, Knowledge Unlatched, Open Book Publishers are also leading the way. Universities with open access mandates and presses like UCL are leading too. But also students and junior academics like you (Ed: *thanks*!) and Stuart Lawson and Erin McKiernan

and Juan Pablo Alperin and many many others worldwide. I don't think OA will become mainstream by mandating it. Transforming it into an administrative burden is not the way. It cannot be a top-down thing. It has to be a collective cultural change involving all of us, here in the UK and around the world.

What role do you see open science, scholarly networks (like ScienceOpen?), and altmetrics playing in this future?

I think of open science as a way of doing things. It is at the heart of the matter. Same for scholarly networks. They develop organically and are grassroots movements. I see altmetrics as related (both Altmetric and ImpactStory are researcher-led start-ups) but they have to operate, like the rest of us, within a ferociously competitive post-late-capitalist context. Altmetrics developers, like many researchers today, are put between a rock and a hard place; they also want to have their cake and eat it too. I think it is possible to do that ethically. It's about changing the way we understand the value of sharing and the value of online attention. It's about understanding the challenges and opportunities of mapping scholarly networks and scholarly activity online and on social media. It's about being realistic, that capitalism won't simply disappear and that academic work and publishing do cost money. It's about addressing the inequalities in the system and looking for pragmatic, legal transformations. The law can be changed within the law, and culture can be changed within specific cultures. Specifically in our context it's about focusing on what happens with articles or individual outputs, and not necessarily on journals or publishers as brands. It changes or at least challenges the reputational economy and this seems to me like a good thing.

If you could give one piece of advice to students looking to pursue a research career, what would it be?

Believe in yourself. Believe in the power of ideas, and in the power of collaboration and sharing. Rome was not built in a day. Higher education and science need people who can ask the right questions and who understand the challenges and opportunities. We need people who are imaginative and who are willing to take risks. Spot who is doing what you are interested in doing and learn from them. Approach them, share ideas. Look beyond your immediate circle. Look abroad, in all cardinal points, in different languages. And take it from there. Most importantly, which is also quite tough to achieve: do not let fear stop you from doing what you believe in or define what you do or how you do things.

JULIEN COLOMB

Fig.24. Credit: Julien Colomb

JULIEN COLOMB ON OPEN SCIENCE AND FIRING LASERS AT FLIES

Hi Julien! Thanks for joining us at the ScienceOpen blog. Could you start off by letting us know a bit about your background?

Hi John. My pleasure to be here. [*We've known each other for a year and he still can't spell my name*..]

I have been interested in neurobiology since my high school time; I got to work with *Drosophila* during my Master's thesis and could then not leave the field. I worked about 10 years on the neuroanatomy and behaviour in the fruit fly larvae and flies in Switzerland, Paris and Berlin. In 2013, I decided to stay in Berlin when the mentor of my second post-doc, Prof. Brembs, moved to Regensburg. In the last 3 years, I have been jumping between different jobs in Prof. Winter groups, I have been wandering in the startup community in Berlin (founding Drososhare GmbH), and trying to foster open science and open data. At the moment, I work half time at the Charite animal outcome core facility, while we work on getting a beta version of the Drososhare product (a platform to share transgenic Drosophila between scientists). I also run the Berlin Open Science Meetup.

When did you first become interested in Open Access? What was your initial reaction when you heard about it?

As a scientist, being in big institutions, I rarely had problem accessing any paper. When I heard about PLOS One (probably in 2010), I was interested in the idea of one single megajournal, and did not get what the open access movement was. It is only in the last two years that I got to understand what Open Access means, and now, the problems of library budgets I heard as a PhD student in 2005 became relevant to me! I am glad the Open Access war is over (even Elsevier state that they are pro-open access), now starts the war for a fair price for Open Access, and this will be a tough fight.

Figure 25. Drososhare (Source)

You recently had a paper published in PeerJ about motor learning in fruit flies. Can you tell us a bit about this and your ongoing research?

Brains are not like computer input-output systems, but work mainly as output-input systems (they first produce behaviour and then modulate the output depending on the input they get). In the lab, we aim at understanding how this system learns, especially why learning-by-doing is more effective than passive learning. Despite a century of research this is still puzzling. We therefore started at one corner of the puzzle and tackle the question of the biological bases (which neurons, which genes) of "pure operant conditioning", something related to motor learning and where the brain works as a pure output-input system. In practice, we punished a fly (with a laser beam!) when she is trying to fly to the right, but left turning attempts are safe (the fly is not moving at all). After 8 minutes of training, flies are doing the safe behaviour more often than the previously punished one in a 2 min. test. In this paper, we have shown that this learning is dependent on the action of a protein kinase C in the motor-neurons of the fly. It is very interesting to see that neurons so close to the action performance are plastic, and that what we do does not depend only on our brain.

On the technical side, I had to build together a machine which can measure the torque force (yawn) the fruit fly is producing while flying (the fly is glued to a hook and cannot move). I also develop new algorithms to collect, archive, analyse and present the data in a couple of button pushes, mainly using R code.

Why did you choose this journal to publish your work in?

We wanted an Open Access journal, we had mitigated experience with PLOS One, Research and wanted to test another one. Since I was writing the manuscript on Overleaf, we wanted to try PeerJ. We also got a membership account, such that we will be allowed to publish one paper a year free in PeerJ from now on. Since I may leave academia, I also thought it would be a way for me to publish other papers in the next years without having any funding.

How important is Open Access publishing to you at this stage of your career?

I made a statement in January. I think the 'publish or perish' culture and the impact factor games are rubbish and I will not play that game (even if it means leaving academia). Open Access is a must, and I am pushing it also when I am not first author. My "career" is getting out of academia, and for me the only thing which matters now, is do the right thing for science, even if this is bringing much for my scientific career. On the other hand, some people proved that going the open access way can be productive for your career.

You also published the 'negative' results from your research. Why did you do this?

The good question is why would I not do it. I worked hard to obtain these negative results, there is information we can take out of these experiments. It is not because I failed to find the answer to the question I had that my attempts have no value.

Why do you think many researchers choose to with-hold publishing their 'negative' results? What does this say about the current system of scholarly publishing?

In most cases, it is just not worth the work and that is as simple as that. On one hand, negative results cannot be published in high standard journals, on the other hand, the time to invest to publish them is a least as high as for positive results. In my case, the cost of adding the negative results was not significant (the data was analysed and the graph were produced using the same code as for the positive results), and the benefit was … well we will see if there is any.

You also made all the data and code supporting your research available via Figshare (details here). Why did you choose to do this? How important is it to you that all outputs of research be made available and re-usable?

I took that question very seriously when I started to collect data. We wanted to do our science more open, but were lacking the tools to do it. At the end of our journey, I had learned to use R and Figshare, I got to know the ROpenSci team and I could bravely say: "Open data has no cost: it is time investment done at the right time". Indeed, it occurred to me that I had saved time by getting a workflow aiming at open data per default. For instance, while the manuscript was ready, I decided to add a violinplot over the boxplot for all figures (9 plots for 3 figures): it took me about 15 minutes from the time I had the idea to the moment the figures were inserted in the overleaf produced manuscript. The same process with a "normal" workflow would have taken at least two days.

You've also recently built a ScienceOpen Collection on Alzheimer's Disease. Why did you choose to do this, and how does it fit into your current research plans?

I got recently involved in a project aiming at curating the preclinical literature for behavioural tests used to model specific neurological diseases. As a pilot, we are analysing one mouse model of Alzheimer's disease. I thought to use the collection system of ScienceOpen to:

1. Gather the literature on one place;
2. Having a platform to discuss putative discrepancies between results and hypotheses;
3. Be sure that this work will not end in a drawer in cases there is nothing worth a publication in our findings.

Where do you see the future of scholarly communication? What steps are needed to get there? And whose responsibility do you think it is to lead this change?

I do not care about scholarly communication much. My thing is data quality and science reproducibility. By doing the plan about data archive, analysis and publication before starting to gather data, we could get rid of most problems we have in science reproducibility. As a plus, we would also be faster, and as a by-product, scholarly communication will change, we will see more micro-publications and data-publications for instance.

If you could give one piece of advice to students looking to pursue a research career, what would it be?

First, be sure about what you want: if your dream is doing science, do it without thinking about making a career. If your dream is having a research career, do it without thinking about science. For a successful career, you have to make your move in the 3 first year after your PhD, and get a 5 years grant during your 4th year. If you miss that train, give up the career path and try to do science, inside or outside of the academic universe. But above all: have fun and get to know as many people as you can.

COMMANDER JEAN-PAUL CHRETIEN

Fig.26. Credit: Cmdr Jean-Paul Chretien

COMMANDER JEAN-PAUL CHRETIEN: OPEN ACCESS, THE MILITARY, AND PUBLIC HEALTH EMERGENCIES

Hi Commander Jean-Paul! For starters could you let us know a little about your background?

Thank you for interviewing me. Let me say first that throughout this interview I'm expressing my own views, not necessarily the official policy or position of the Department of Defense, Defense Health Agency, or US Government.

I'm a physician in the United States Navy, and my training is in public health, epidemiology, and informatics. I work on challenges at the intersection of health and national security, like infectious disease outbreaks and climate change.

I was drawn first to the military, before medicine, but I knew what life as a doctor is like because my parents are physicians. I wanted to be a military officer from a pretty young age. Service to country, the chance to lead, the adventure – all of that appealed to me. For college I went to the U.S. Naval Academy in Annapolis, Maryland, thinking maybe I would command a warship someday. But while I was there, studying international affairs and national security, I learned that some of the most pressing security challenges were health problems like HIV/AIDS, at the time. And I learned that in many battles and wars, diseases crippled military forces and civilian populations in war zones. Infections often caused more casualties than combat.

So I decided to go to medical school, but not to be a doctor practicing in a clinic. I wanted to be a doctor for populations, and bring medical knowledge to decisions that impact military service members, the broader American public, and, well, everyone.

When did you first hear about Open Access and Open Science? What were your first thoughts? Has there ever been a case where lack of access to information has seriously compromised your work?

When I was a student working on my MD and my PhD in epidemiology, I didn't think about Open Access because access wasn't a problem for me. Through my university, I could access just about any journal article I needed. But later, when I began my global health work in the U.S. military, I saw how access restrictions constrained biomedical research, patient care, and population health around the world.

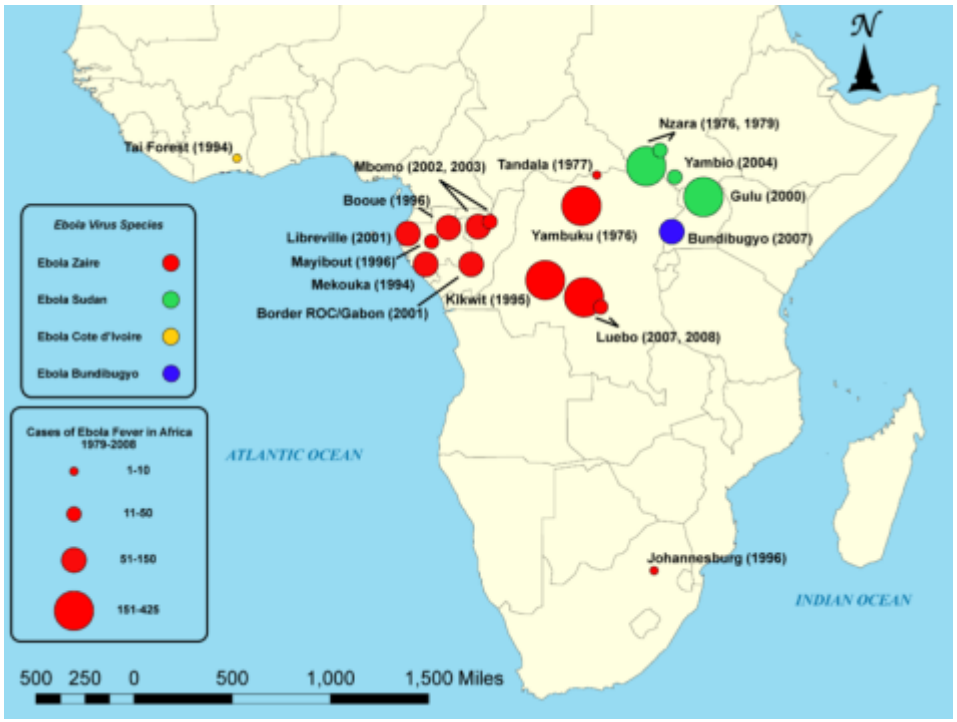


Figure 27. Distribution of Ebola Virus Outbreaks 1979-2008 (Source) CC BY-SA 3.0

At that time, I worked in a Department of Defense program that partners with dozens of countries to improve their capabilities for detecting and containing epidemics. I had collaborators around the world, public health personnel and researchers in countries with limited resources, who could not read about studies on the diseases that burden them. How can they join the global effort against infectious disease outbreaks if they can't always access the most current and best research on those diseases?

Then, what galvanized my commitment to open access and open science in general was the Ebola outbreak that began in West Africa in late 2013, and spread to Europe and the U.S. It's waning now, but infections are still occurring. There have been more than 28,000 confirmed cases with around 11,000 deaths, by far the largest Ebola epidemic ever.

How can people join the global effort against infectious disease outbreaks if they can't always access the most current and best research on those diseases?

When disease transmission was intense, data was essential for an effective response – public health agencies needed to know, in as close to real time as possible, where cases were occurring, what the presenting clinical symptoms were, how transmission was occurring through contact networks, where containment was succeeding and failing, and whether the virus was changing.

Many health workers and scientists participated in the response, and many shared the data they collected freely. But some did not. Journal articles would appear with months-old data, which might have been more useful earlier. Colleagues and I assessed this publication lag and data-sharing practices as part of a broader review of the Ebola outbreak, which we published in eLife, an open access journal (https://elifesciences.org/content/4/e09186v2).

As the outbreak was winding down, in September of 2015, I was invited to join a consultation convened by the World Health Organization on data-sharing during public health emergencies. The WHO brought in representatives from the biomedical research community, biomedical journals, pharmaceutical companies, funding agencies, and governments to advance new norms for rapid data release. Participants agreed that sharing data before publication should be the norm during public health emergencies (http://www.who.int/medicines/ebola-treatment/blueprint_phe_data-share-results/en/). I endorsed this view as an individual; I was not asked to nor was I authorized to consider it on behalf of the Department of Defense.

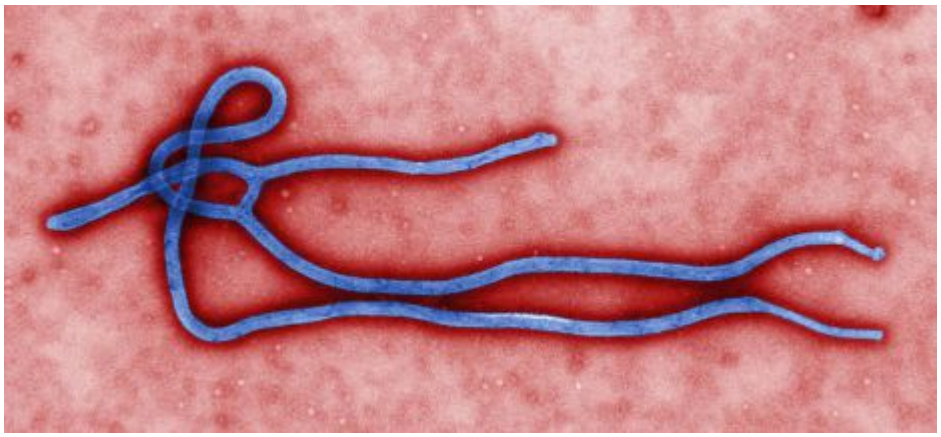


Figure 28. The Ebola virus virion

How important is it to share data and methods openly and rapidly? Do you think views on this differ between the military and institutionalised academic research?

Sharing data and methods as openly and rapidly as possible is critical during public health emergencies like infectious disease outbreaks. We saw this with Ebola; groups that shared data publicly enabled many more studies. In our review, 80 percent of published studies on Ebola transmission dynamics used only data that other researchers had already posted online. We see the importance of data-sharing now with the Zika virus outbreak. There are scientists around the world who are willing to contribute their expertise, and can provide important new insights for the response effort, if they're able to access data that others are collecting.

With biomedical research and public health programs in the military, we see similar successes and challenges in open data sharing. We do have the additional consideration of operational security – for some efforts, we must think carefully about whether releasing the data publicly could compromise a mission or national security more broadly. But across the Department of Defense, agencies are looking for opportunities to release data appropriately. This is in line with the President's Executive Order in 2013 making open and machine-readable data the new default for government information (https://www.whitehouse.gov/the-press-office/2013/05/09/executive-order-making-open-and-machine-readable-new-default-government-).

Why do you think some research communities are resistant to the idea of openly sharing data and methods?

It's understandable that research groups collecting data may be hesitant to release it openly. One common concern is that others will not understand the data as well as they do, and as a result might commit analytical or inferential errors. Investigators who collect data could reduce this risk by annotating their data well and providing appropriate metadata. Often, scientists are accustomed to recording and storing data in a way that makes sense to them, but may not include the additional information that others would need to use it appropriately.

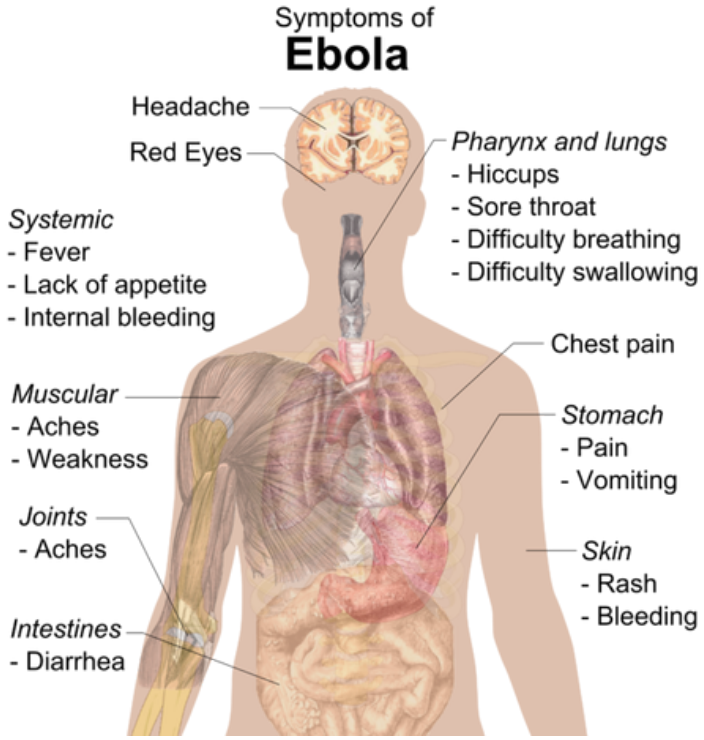


Figure 29. Symptoms of Ebola. The more you know..!

And there's long been a concern that pre-publication data release could compromise future peer-reviewed publication. But I think we're seeing a shift in biomedical research, with some prominent journals now stating clearly that pre-publication data release will not prejudice later consideration for publication. For emergency situations in particular, pre-publication data release is the expectation among some journal editors.

My personal view is that investigators should be expected to deposit all supporting data in a public archive once it's appropriately de-identified and quality-assured (again, a personal opinion, not an institutional view from Department of Defense). If more and more within the research community do this and demand it of others, I think it will become the norm.

Any thoughts on the Wellcome Trust's commitment to open data sharing in wake of the Zika crisis? Why do you think this is emphasises in times of health crisis, instead of being the default for all research?

The broad coalition that endorsed the Zika data-sharing commitment is a major advance for open science. It shows that norms are changing in the biomedical research community, and that, more and more, open sharing is the default.

True, the move to open data is most evident for public health emergencies. It makes sense to focus there initially, since the need is pressing and the case for openness compelling. But I think we can build on the emerging consensus around openness to reduce obstacles to data-sharing in biomedical research more generally.

How can 'open advocates', policymakers, and researchers all come together to promote a culture of open sharing?

We need to credit researchers who share data and honor data-sharing as a scientific contribution as significant as original research. At least as significant as original research, since sharing enables others to confirm previous results or make new discoveries.

For this to happen, we need to be able to track use of shared datasets. For example, as a first step, journals could insist that authors who use external datasets cite them in a standardized and discoverable way, and not simply thank the data providers in the Acknowledgements section, which often happens. At the same time, researchers who develop and share datasets could identify them in a standard way, like with digital object identifiers. With agreed approaches to citing and identifying datasets, we could envision a system that comprehensively tracks use of open datasets, and supports emerging metrics around data-sharing.

This is just one small, possible part of a better approach. For this and other open data initiatives, we must engage all of the stakeholders, including academic departments, which could decide that data-sharing is a scientific contribution and consider it in faculty evaluations; journals and research sponsors, which could use their leverage to push for openness; and the public at large, which, after all, should be the primary beneficiary of biomedical research.

You work for the Armed Forces Health Surveillance Branch of the Public Health Division within the Defense Health Agency. What role does open data play in your daily operations?

Our mission at AFHSB is to provide timely, relevant, actionable, and comprehensive health surveillance information to promote, maintain, and enhance the health of military and military-associated populations. Some of the data we use to accomplish this mission cannot be open, because of privacy or security constraints. For example, we maintain a very large database called the Defense Medical Surveillance System that integrates data from the Department of Defense electronic medical record and other deployment, clinical and demographic databases which contain personal identifying information. AFHSB analysts continually use these data to assess possible health threats to our population.

But we also look beyond the military, at disease outbreaks and other health threats around the world that could impact the Department of Defense. We make extensive use of open data to do this. Our Alert and Response Operations Team, for example, scans many online, open source types of information sources daily, and combines open information with information shared in interagency and other professional networks.

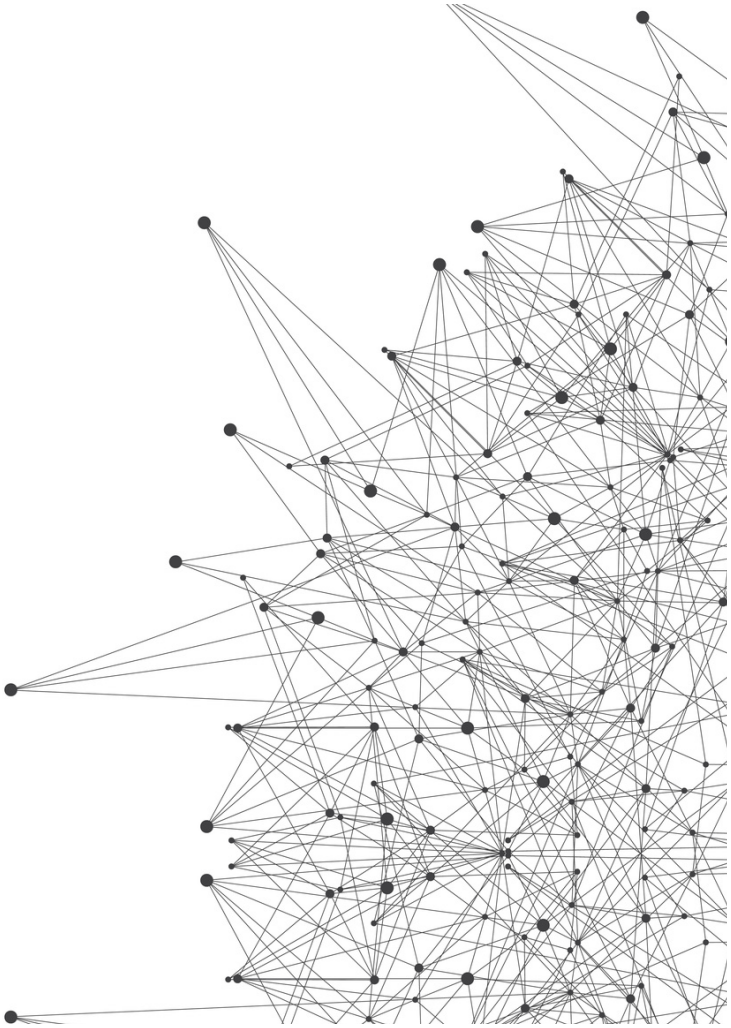
What advice would you give to students looking to take their first steps into a research career?

Find a good mentor! In my mind, this is someone who is accomplished in an area that interests you, even if it's not exactly what you had envisioned doing; is passionate about their work, and sees it in a broader context beyond the immediate research aims; and will be generous in devoting time to you.

JOSH KING

brevy

Figure 30. Credit: Josh King



JOSH KING: SCIENCE WORKS BEST WHEN IT'S OPEN AND OPENLY COMMUNICATED

Hi Josh, thanks for joining us! Could you tell us a bit about why you started Brevy?

Brevy is an independent, volunteer group of a few stubborn individuals who work on the project during our off hours (read "nights and weekends"). While my own day job is in science outreach, I work with a couple of other partners (a fantastic computer science start-up owner and a behavioural psychologist make up our merry band) to help direct and maintain the site. We're nothing special on our own, so the real stars here are those that pitch a hand adding summaries to Brevy or introducing it as class assignments to help grow the body of content!

When did you first hear about Open Access and Open Science? What did you first think?

That would likely be during my undergraduate years studying biochemistry and becoming hopelessly frustrated trying to write reports using papers I often had no access to (even with our university library!). At the time, I thought the concepts as fanciful dreams, but thankfully here we are with open access a growing paradigm and various open science platforms blossoming around the web.

What do you think the biggest problem with the current scholarly publishing system is?

Meaningful publishing. By reasonable estimates, at least more than a 1,000,000 academic papers are published each year. These works are published on platforms known largely only to academics, and then only to that specific subset of academia. Publications on these platforms are not always accessible even to this select group and generally do not well support further dialogue or dissemination, with a surprisingly significant number going uncited. Taken pessimistically, this is tantamount to ejecting hundreds of thousands of new pieces of knowledge into the void each year.

We can be optimistic about this however! Taken optimistically, there are hundreds of thousands of possibly exciting and ground-breaking new ideas all of the time that most of us don't know about! But to see it this way, to truly believe it, we have to start caring about the meaningfulness of research. We have to start thinking about different types of impacts than citation count and means of prestige other than the journal name. And we have to care what our work means to the world outside academia.

Why did you choose to launch Brevy? "Summarising the World's research" seems like a mammoth (but awesome) task!

It came from a mixture of both frustration and hope. Frustration that, as a mentioned, so much knowledge is being produced – more than ever before in mankind's history – and yet the overwhelming majority is inaccessible, unreadable, or utterly unknown to the world. But also hope! Hope that much of "how we know" what we do can be demystified to the general public, hope to break down the walls between scholarly works and the very same individuals they should theoretically benefit, hope that the light shined by our pioneers of knowledge can shine a little brighter and that the world will be all the better for it.

Brevy uses a 'Wiki-style' model. What does this say about the idea of treating research like a process, rather than just assuming a paper is the end of that particular discussion?

The "life" of a paper really doesn't begin until after its publication, and as such, we should be at least equally concerned with this time rather than letting publication be the end-goal. How do we discuss the paper? What forum exists to ask questions about it, to analyse it further? What is its evolving significance? What if we discover new information that changes the conclusions we should derive? How do others find it, and how is it explained to them? The typical publication medium itself generally offers, astonishingly, little to no answers to these concerns.

As a wiki, Brevy can offer option to these concerns – a work's written significance and critical response is allowed to evolve, it's explanation may be constantly improved upon, and a centralized location (i.e. talk pages) are offered for discussion.

How does Brevy contribute most to ongoing scholarly communication? And how can researchers contribute to it?

Brevy provides a means of approaching and discussing scholarly literature in an open and easily understandable way, a repository for research that cares about being heard and understood by diverse audiences, and it allows anyone to contribute and access it freely, quickly, and easily.

Researchers particularly can contribute by adding summaries of their own works, or works they read, to the site. It's extremely quick and then allows you an easy link to and share your work or keep tracking of said readings in the future. Or, if one teaches, making summaries a class project allows an excellent venue to expose students to real research early on while also contributing to a larger and meaningful framework. Getting contributors for this is no easy feat, so we welcome a shameless plug wherever we can and would love anyone who buys into the idea incorporating it into their coursework!

How important do you think access and accessibility are to research? Do you think the latter is often overlooked in discussions of the former?

Certainly. An openly published paper may still remain in equal anonymity if not understandable by and disseminated to diverse audiences. A perfect example of this is research being done across disciplines or from the industry. The technical language in one field may render a work difficult or inaccessible to those trying to approach it from another, sometimes even in a closely related field or background. Presuming said individual will always take that extra time to learn the second language of that other field with little aid is idealistic, if not haughty.

Do you think more researchers should be looking to engage the public with their work? How would you recommend they go about doing this, if so?

Absolutely! One thing we often forget is that much of research is publicly funded, and as such, there should not only be a return on investment to the public, but also a return on information to keep what are (effectively) its stakeholders well-informed. Not to mention that further funding comes from further interest!

As far as how to do this, I believe there are two key elements– accessibility and discussion. Accessibility means that the research is able to be directly visited and understood. There should be somewhere that anyone can go to see and really understand what you've done (hint, Brevy summaries are one solution for this). The discussion part is more difficult, but with the advent of social media and the web, it's easier than ever to find target groups who are directly interested in your line of work and to casually nudge them in your direction. Tweet, blog, post on Reddit, speak at science cafés, get involved with your university's outreach department, but do something, and you'll most certainly enjoy it!

At ScienceOpen, we try and reward these sorts of activities by making reviews open and citable. What other sort of incentive systems do you think could work for getting more researchers to engage with post-publication research discussions?

Perhaps granting the scholarly community an even stronger voice in recognizing significant works, acknowledging great research, and even curating it might provide some of this incentive. Theoretically this is already done across journals, literature reviews, and conferences, but given the sheer volume of work now being published (along with the impressive growing number of journals), these methods seem a bit archaic for today's time to rely on predominately. If there was also some way to build up credence and respect as a positive and effective reviewer, that may also help. Some of these thoughts might be well answered by components you commonly find in social media networks which, although might be initially unaccustomed to the demographic, has obviously shown great strides in sectors all across our culture and could help build community in this case.

It's certainly something that needs to happen more either way. At Brevy we're trying to leave room for some of this by providing a section of the site (the "Community" namespace), where we hope that some of that discussion might build. This coincides with voting capabilities for research works and talk pages on the main summary pages themselves, so I definitely think this after-the-fact discussion (and making it visible!) is important.

Where do you see such post-publication activities fitting into scholarly evaluation processes?

I think academics and the scholarly publication world may be somewhat subconsciously afraid of giving up the "golden ticket," so to speak, of pre-publication-only review, but I'm personally glad sites like ScienceOpen are trying out alternatives. By "golden ticket," I mean a sort of sentiment of "It's published! It's now slated in stone as Science! Done!". Meanwhile, the truth is that the book is not closed, and what is good research today may be found better with different conclusions upon further study (and vice versa). Open discussion is needed, not only so that we know what the other experts are thinking, but so the status of our knowledge can be dynamically updated in real time. Without such, we are left waiting on the next published paper to review the original (which may come who knows when and who knows where, if it does even manage to be published in the first place).

It is only sensible then that we take advantage of the technology available to us, so I'm glad ScienceOpen takes this to heart. We need less static, stagnant means of publishing. And we need to recognize that, even if post-publication review can be scary in that it somewhat puts yourself out in the open and leaves you there, it provides the opportunities to get questions

answered and to grow our knowledge at a faster pace. Whereas platforms like ScienceOpen or, for instance PubPeer, can offer such options to the scholarly community, Brevy can provide an option of this for the general public on a more informal level.

Where do you see the future of scholarly publishing? And what steps do we need to take to get there?

That's very hard to say as, even now, we still have quite a long way to go to make open access a full reality. If I were to forecast far, far ahead though, I think aggregation, community, and outreach will be the big improvements we will (or at least should) see. Aggregation meaning that we have an ever-growing body of knowledge that will need to be tagged, filtered, and curated with a much-improved efficiency. Community in that scholars will engage in more discussion about new works on platforms that are open and highly visible, and that said discussion will generate a meaningful impact in how we proceed with the work. And of course outreach, as we will realize that publishing in and of itself is not necessarily meaningful and find new ways to measure its meaning and effect. Funding stipulations are already growing to encapsulate this, and I think (hope) we will see an increased concern on the openness and understandability of research, as well as really promoting it so that it can make a difference.

As far as how to get there, you're being even harder with your question! But I do think a lot of the platforms for this currently exist. Brevy provides one layer to the outreach and community aspect. We have toyed with the idea of wiki-style curation of research topics also, though it wasn't well received. Semantic publishing movements are interesting in terms of topic aggregation though. And of course I've already mentioned my respect for sites like ScienceOpen and PubPeer for increasing community discussion and engagement. Then there's also burgeoning new ways to look at effective impact like Altmetrics. All this noted, I think the uphill hurdle is really just convincing scholars of the utility of these platforms and that a better world of research lies around the corner once we prioritize more the connections and impact research makes with the world around us.

FIONA NIELSEN

Figure 31. Credit: Fiona Nielsen

FIONA NIELSEN: DATA SHARING IS CRUCIAL FOR GENOMICS RESEARCH!

Hi Fiona! Thanks for joining us at the ScienceOpen blog. Could you start off by letting us know a bit about your background?

Pleased to join your blog series. I am a bioinformatics researcher with a background in computer science. My first degree was a short computer science degree, which I then expanded by studying bioinformatics at the University of Southern Denmark, where I gradually moved more and more into genetics and DNA sequence analysis. After my masters I moved to Nijmegen, the Netherlands where I studied for a PhD in bioinformatics at the NCMLS. During my time as a PhD student, my mother was diagnosed with cancer, and I lost my motivation to work on scientific topics far removed from patient impact. I moved to Cambridge, UK to work for Illumina, and after two years I decided to leave my 9-5 job to start my own project: I founded first the charity DNAdigest and later the company Repositive to enable better data sharing within genomics research.

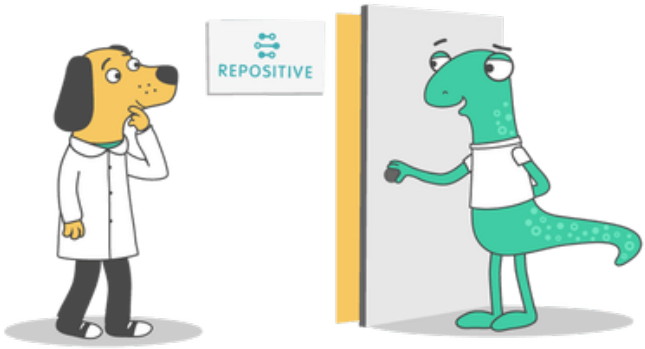


Fig. 32. Cute! Had to share it from the Repositive site (https://repositive.io/

When did you first become interested in Open Access and Open Science? What was your initial reaction when you heard about it?

I do not recall when I first came across the terms of Open Access and Open Science, but I do recall that I repeatedly came across anecdotes from colleagues that could not access data or results from published papers, and how I looked up to the progressive researchers who would "go all the way" and make all data and results available immediately, even before publication of a paper.

How much of a struggle was access to data in your experience as a researcher?

My bioinformatics research has always been dependent on having access to the right type of data for testing my hypothesis. For small scale (algorithm) experiments, the data from colleagues or from an internal project was sufficient for me, but I always ended up looking for external data to validate my findings. I soon realised that 1) the right type of data is not easy to find 2) the data sources are not easy to access. When I realised the bigger picture of how

this data bottleneck is inhibiting progress in genetics research, I started thinking about how to make more data available and accessible for research.

How did you start the not-for-profit DNAdigest?

I got so frustrated with the lack of data access that I decided to leave my job at Illumina to found the charity DNAdigest to develop a community initiative to enable more efficient and ethical data sharing for the benefit of patients. This was in March 2013 and I immediately started running public events, workshops and hackdays.

Why did you choose to found Repositive as a spin-out of this company?

DNAdigest soon made lots of progress in building community and public engagement, but it was extremely difficult to raise funding to start building solutions, so in August 2014 Repositive was spun out of DNAdigest as a social enterprise, a commercial company driven by the same impact mission as the charity: to enable efficient and ethical data sharing for the benefit of patients. As a regular company, Repositive raised investment from angel investors to start building software to help researchers access more genomic data faster.

How important is data sharing in the field of genomics research?

Genomics is a data science. The human genome is vast – 3 billion base pairs. To make any significant findings from the data, you need lots of data for validation and comparison. It is impossible for anyone research group, lab or institute to generate all the data that is relevant for any one disease, so data sharing and collaboration across institutions is paramount for the quality of genomics research.

Why is there such a huge gap between data generation and data accessibility in genomics research?

While virtually all of the research community recognise the need for data sharing and collaboration, it is an uphill battle to change the culture and incentive structure of academia. The most recognised metric for research output number of papers published in high profile journals. As long as data sharing is not part of the agenda or incentive structure, it remains a side project – a nuisance – which is only taken care of last minute if at all when publishing papers. Researchers would rather spend their time writing papers and grants than spending time and effort making their data available and accessible.

What are some of the potential barriers to data sharing?

Data sharing in biomedical science, including genomics, is complicated further by the potentially personally identifiable information (PII) in the data. This means that data needs to be sufficiently de-identified and access processes need to be put in place to ensure that data is used in accordance to the consent given by the data/sample donor.

Whose responsibility do you think it is to lead this change?

I think all researchers who are using biomedical data should think twice about the impact of the data. The individuals, often patients with serious diseases, gave consent for their samples and data to be used for research to make a difference for research to help future patients. Not sharing data, not making the most of data, is not meeting the expectations of the data donors. So even if it takes time and effort, it is in my opinion, part of the obligation of the research community to enable data sharing to maximise research impact. Next to incorporating this mind-set among researchers, I think the power to change the incentive system lies with the research funders. The day that funders require that all your biomedical research data must be made available for reuse by the research community before they will give you another research grant, I am sure that you will start taking data sharing seriously.

Do you think we need to give more consideration to data as a measurable output from research, rather than focussing almost exclusively on papers?

I think data should be cited and data usage measured with as much emphasis that we are currently giving to papers and paper citations. Today the tools for doing this are already available: Data deposited in repositories are given digital object identifiers (DOIs) and it is possible to make specific data publications to draw attention to the effort that was put into creating the data and suggest possible reuse. All of these research outputs can and should be cited to encourage more data to be made available.

If you could give one piece of advice to students looking to pursue a research career, what would it be?

I usually give three tips to young researchers who work with biomedical or genomics data:

1. Cite data – to encourage more data sharing

2. Publish data – you will get more citations and visibility the more data you publish

3. Understand consent – you must always understand the consent for the data you use.

The more you share, the more the research community will benefit, and the more visibility and credibility you will get for your further research career.

The more you share, the more the research community will benefit, and the more visibility and credibility you will get for your further research career.

BINNA OJEMENI

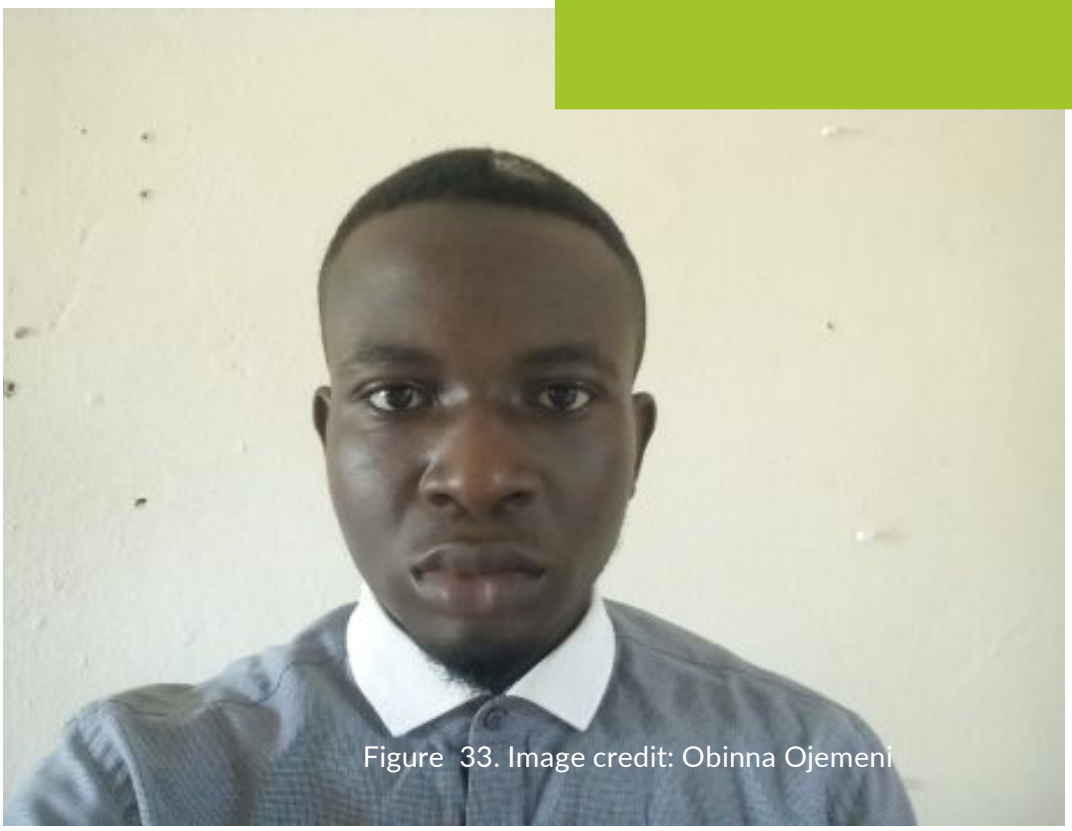


Figure 33. Image credit: Obinna Ojemeni

BINNA OJEMENI: LET'S STOP TALKING, AND START DOING OPEN ACCESS IN NIGERIA!

Hi Obinna! Thanks for joining us. Could you tell us a bit about your background?

I am from the South-eastern part of Nigeria and the third/last of the three sons of my parents. I attended Nnamdi Azikiwe University where I obtained a Bachelor's degree in Science Education & Mathematics. After my National Youth Service Corp (NYSC) program, I proceeded to the premier University of Ibadan where I obtained both Master of Education and Master of Information Science in 2010 and 2014 respectively. A Science Educationist and Information Scientist by training, and presently a University Teacher in the newly formed department of Library and Information Science, Enugu State University of Science & Technology. I am also a Doctoral (PhD) student in Nnamdi Azikiwe University where I'm studying Information Science with special focus on developments in Nigeria's Open Access publishing landscape and bibliometric studies.

When did you first realise you wanted to be researcher? What was it that turned you?

That would be probably after my Master of Education degree program in the department of Teacher Education, University of Ibadan, which is also where I learnt how to do research and had academics that inspired me too. Besides having been trained as an Educationist, the best career would be to educate the younger generation and encourage them too as well as change the poor perception about the teaching profession.

I would rather emphasize that I come from a family of teachers, both my paternal grandparents were secondary (grandfather) and primary (grandmother) school teachers respectively. While my Mother was a Secondary school teacher, which is why I decided to take the family legacy to another level becoming a University Teacher

When did you first hear about Open Access and Open Science? What did you first think about it all?

I was introduced to Open Access by my Master of Information Science Project Supervisor, Dr Williams Nwagwu at Africa Regional Centre for Information Science (popularly known as ARCIS) in University of Ibadan, Nigeria. Before then I was proposing a bibliometric study of a local journal published by a scholarly society and suggesting its' inclusion in the Directory of Open Access Journals (DOAJ), but had no knowledge of the concept of Open Access. So I was mandated by my supervisor to read up studies on Open Access which gave me background knowledge of the concept and the BBB declarations that facilitated its adoption globally.

My first thought was the reality that little or no research would have been possible in Nigeria without the free availability of OA publications via the internet. And we as Nigerians especially Academics, are doing little or nothing to foster its sustenance.

What do you think the biggest problem with the current scholarly publishing system is?

There are numerous challenges with scholarly communication but mainly the dominance of commercial publishers who charge huge amount of Author Processing Charges (APC), lack of diversity in the Editorial Team members of most top and internationally acclaimed journals and closed peer review system as well as long delays between time of submission and publication.

Can you tell us a bit about the research environment in Nigeria, and at Enugu State University?

The Nigerian research environment isn't encouraging for 21st century scholarship to thrive. Within the university system in Nigeria, academics are burdened with huge teaching commitments for both undergraduate and postgraduate students as well as with numerous non-academic obligations like administration and supervision of examinations, marking of examination scripts, computation of students' results, project supervision and some other administrative responsibilities. All these make it extremely difficult for an academic to be productive in carrying out research. Ironically, assessment of academics hinges on research productivity and, publishing in Scopus and especially Web of Science indexed journals primarily because of the impact factor syndrome. Same applies to Enugu State University of Science and Technology, but acknowledges and weighs local and international conferences equally which I find to be interesting as well as encouraging local science. The entire system needs an overhaul in order to rescue academia from this Publish-or-Perish syndrome. Regrettably, Nigeria's National University Commission seems to be ill-informed about current developments in Research Evaluation and Scholarly publishing landscape. This has driven most academicians in Nigeria to resort to publishing in obscure and questionable journals as well as in mainstream Toll Access journals hidden behind paywalls and out of reach from Nigerian scholars that will most likely need these publications.

How does Open Access play into your personal research?

The issue of lack of access to scientific literature isn't yet at the forefront of research studies in Nigeria and providing solutions to it seems to be emerging predominantly from western scholars who have access and enormous resources. And most OA advocates are from the west too, but in order to foster local understanding, solution and participation in the OA movement, making it my primary research interest is inevitable. Recently I discovered the OpenCon initiative which I find to be innovative and engaging numerous young scholars from around the world. Hope to be part of it someday!

Is lack of access a problem in your experience? What about for your colleagues and students?

Lack of access to scientific literature is a major impediment to scholarship in Nigeria. I'm not in a position to make a general statement pertaining to issues on access beyond the few universities I have interacted with, but very sure that lack of access prevails in most cases.

Has this changed throughout your education and research career? Is ease of access getting better?

Much hasn't changed yet so far, because Library and Information Professionals in this part of the world haven't stepped up their roles within academic institutions beyond the traditional book-keeping role. Poor information literacy among students is one issue while inaccessibility of relevant academic resources is another. I have resorted to Google search since my studentship and still as a University Teacher.

As a researcher, what other barriers have you faced in your work? And how have you overcome them?

My primary research interest is in Informetrics/Bibliometric/Scientometrics, which requires access to scientific databases e.g. Web of Science, Scopus, Google Scholar, etc. for publication and citation data. But among the three mentioned above, only GS is openly accessible with some limited services and structured framework for optimal data retrieval. Both WoS and Scopus which are the mainstream citation indexes are subscription-based or Toll access services. Lack of access to this set of major scientific databases has hindered most of my research efforts in bibliometric studies. Despite the fact that both databases under-represent the state of science production in most developing nations, and especially Nigeria, it still serves as a globally accepted platform for research evaluation of nations and universities regardless of geographic location.

A recent experience would be when I was executing my Master of Information Science research project on Bibliometric analysis of Nigeria's Biomedical Open Access Journals perceived to be predatory, I identified that some of them were formerly indexed in WoS/Scopus. But due to the inaccessibility of the databases, I streamlined my options to just two OA journals that were delisted by WoS. In order to compliment the limited metrics from GS, I asked for WoS citation data of the two OA journals via an emailing list where I surprisingly received Professor Eugene Garfield's support. In as much as my interaction with Thomson Reuters was a very long and exhausting process which delayed my project defence immensely, it further drew my attention to how hard access to scientific data is for scholars from this part of the world. I really appreciate Professor Eugene Garfield's openness and assistance, but if I was in a western institution my information needs would have been satisfied via the click of a button. Open Access, Open Science, and Open Data for all, please!!!

Do you feel there is a North-South divide in scholarly publishing? What can global research communities do to help overcome this?

Regardless of one's location whether in the global north or south, let's all stop talking and start doing. Because actions speaks louder than words, the west sometimes claim to be projecting an all-inclusive society but clamps down on little efforts from young scholars like myself (speaking from personal experience). For instance, on E-mailing Lists, you find that when you make contributions or ask questions or seek for assistance, it goes with the wind in most cases with few exceptions though! Another striking example would be that a Librarian/PhD student from a developing nation who tried assisting me at some point, after our academic interaction via an e-mailing list, I then realised that the name used on the lists isn't the real name. I just never bothered to ask for reasons, but when I made further reflection on it, I realised that it was for acceptance or inclusivity. So, the divide is beyond scholarly publishing and social interactions too. The global research community should

endeavour to be open-minded so as to enhance the realisation of an open and truly democratic society.

Do you feel that publisher-led initiatives like HINARI are beneficial for researchers and students in developing nations?

Well, there seems to be some iota of benefit in some cases, but HINARI by World Health Organisation might be useful to those in the biomedical sciences. But what I can say for sure that has been beneficiary in my own experience would be MEDLINE (PubMed) database and its services. Most of these access initiatives, for instance, JSTOR, are very limited and provides access to old literature which doesn't meet the needs of a 21st century academic. My recent interaction with JSTOR due to access via my University's subscription was not satisfactory, because an apt example is that of when I needed a textbook to prepare my lesson note for a course but it could only provide reviews of the book. I saw their recent Usage statistics on number of downloads which is about 25.1 million downloads, this brings me to my doubts about altmetrics. Does this set of downloads translate to satisfied information needs of its users? Google Scholar tends to satisfy most of the needs of scholars & students in the developing nations, which is evident in the research productivity of the region so far. I do believe that a survey of most authors in the region reverberate this stance and not these access initiatives by Research4Life, WHO etc. Just my thoughts!

What is the current state of Open Access in Nigeria? Is there much movement from the government on this?

Lack of OA awareness among LIS professionals (both Educators & Practitioners) is a major hindrance to OA adoption while lack of OA policy, ignorant policy makers and inadequate ICT infrastructure makes it unrealisable yet. The scholarly publishing landscape is poorly defined and has no appropriate structure in place to facilitate its development in the nearest future. Unfortunately, most OA journal publishing efforts from Nigeria are either blacklisted or delisted from international indexes and bodies like Web of Science, Beall's List, Malaysian Ministry of Higher Education (MoHE), and most recently, DOAJ, I think. The Malaysian MoHE case was quite a funny development because a flaw by one of the OA journals by a Nigerian OA publisher, made them blacklist all other OA journals owned by the same publisher. Such action is ill-informed because a certain Malaysian author erred, is that enough reason to blacklist all other Malaysian authors? Did the MoHE assess the article contents before drawing conclusions? Or was it just a convenient and easy one since it is a Nigerian OA journal? Well, I am of the opinion that the bad online image incurred by the country in the cyberspace as a result of the email scam, have been transferred to its OA publishing efforts. It can also be attributed to poor perceptions of western leaders about Nigeria, describing it as "fantastically corrupt nation". Most western scholars are also of the view that no quality study can emerge from a region with limited resources, but guess what we are thriving against all odds!!

Nigerian government on the other hand, is known for lack of making informed decisions, and the academia isn't helping matter as well. I wrote a seminar paper on the Assessment of Nigerian Universities' role in both Green and Gold OA via DOAR/ROAR & DOAJ, but found

out there was limited impact. Interestingly, I also discovered that only one private university in Nigeria has an OA policy for its academic staff.

What role do the major publishers, like Wiley, Taylor and Francis, and Springer play in Nigeria? Is it easy to publish in their journals, and is it easy to access the content they publish?

They play no role in the Nigerian scholarly publishing landscape, probably because they know that our scholars cannot afford the author fees that they charge for publication, and probably that the content might not be attractive to their intended customers in the Ivory tower. These set of mainstream journal publishers are not accessible for use in terms of consultation and contributions. I rarely see African and Nigerian authors publishing with them except for few contributions from those affiliated with international institutions. I would reiterate the known fact which states that publishing in such sources can be regarded as publishing to the wrong audience and buying into the broken system of scholar/research assessment in this Publish-Or-Perish crusade era.

Where do you see the future of scholarly publishing? And what steps do we need to take to get there?

The future lies with Mega-journal publishing model especially the option of non-APC OA journal. Well, I'm not very familiar with PeerJ's publishing model yet, but I perceive it to be a wonderful development.

If you could give one piece of advice to a student wishing to start a research career, what would it be?

To be open-minded and self-reliant, and most importantly, embrace social media platforms like mailing lists, Twitter etc., to facilitate open discussions on issues of interest.

JOE AKIN

Figure 34. Credit: Joe Akin

JOE AKIN – COMBATING THE REPRODUCIBILITY CRISIS IN RESEARCH

Hi Joe! Can you tell us a little bit about your background to get things rolling?

I have always been interested in science and technology. It was this interest that, in part, drew me to attend the US Air Force Academy and afterwards serve as a scientist in the Air Force Research Laboratory, supporting the demanding technological needs of the US Air Force. After completing my service and wanting to direct my scientific effort towards biomedical science, I pursued a PhD in immunology at Harvard University. Because of the university's great breadth of scientific pursuits, I was able to find a lab where my previous expertise in engineered materials and biomaterials was useful within the context of immunology research—novel materials for cancer vaccine delivery.

When did you first hear about Open Access and Open Science? What were your original thoughts?

I first heard these concepts at the Council of Science Editors conference in the spring of 2015. I thought they sounded like laudable ideas, and I was particularly interested on two fronts:

- How to get scientists to change from convention and support a new paradigm?
- How to get publishers to do likewise, especially when it threatens the financial outlook for their institutions?

What was the rationale behind building Scimpact? How does this fit into your future vision for Open Science?

The impetus for Scimpact grew out of Girija and my frustrations, towards the end of our PhDs, in knowing that a lot of the hard work we had done would never be communicated to the larger scientific community and the prospect of many others duplicating the work we had done, needlessly. I believe it was an altruistic driver, from the outset.

Figure 35. Credit: Scimpact

What are the advantages of using Scimpact over traditional publishing models?

Scimpact aims to integrate with a lot of the current activity around making science more open. We are just one piece of a potential solution. We focus on the under-resourced

element of making reproducibility of results transparent. We believe reproducibility can be the foundation for communication, rather than novelty.

Why is rapid publishing of results so important for research?

When you think about it, closing the cycle time of experiments directly impacts reproducibility. How hard is it to confirm an experimental result, especially in biomedical science, when the published experiment was conducted months, if not years previously? The original researchers might not even be able to do that, what's more someone in a different lab.

How has the research community embraced Scimpact? Why do you think some are so reluctant to move beyond non-traditional communication methods?

Mainly due to Girija's efforts, we have over a hundred followers on Twitter and have presented our idea at multiple conferences. Most recently, Girija was awarded a fellowship by Force11, an organization created to foster a new era of open science.

How do tools like Scimpact help to combat replication issues, or similar issues with a lack of transparency or reproducibility?

Our vision for Scimpact will allow all users to curate experimental replicates they are interested in, in effect crowdsourcing the reproducibility of published literature. A user of the platform would be able to view all the reproductions of an experiment and all the associated materials and methods with as little clutter as possible. Under the conventional model, materials and methods are often curtailed due to print word count restrictions. We believe this is some of the most interesting aspects of a story. Suppose a fictional experiment– why did two researchers obtain the exact opposite result from each other, ostensibly doing the same experiment? Was it the antibody, or something else?

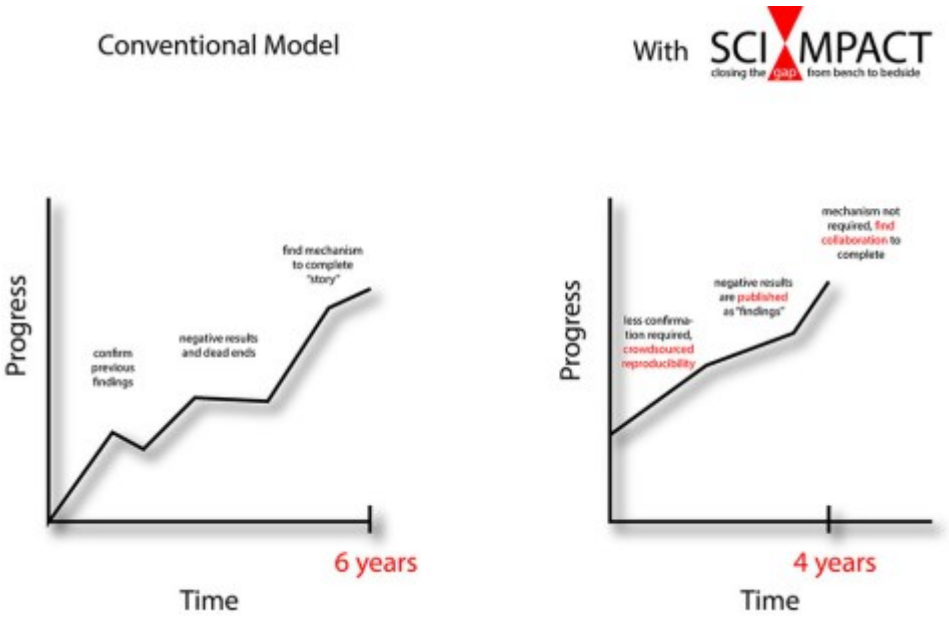


Figure 36. Credit: Scimpact

What can you tell us about the Mini Reproducibility Project?

Mini Reproducibility Project aims to provide the first tool in our vision of crowdsourced reproducibility. It is a web extension that helps users curate single figure publications, adding important context to a growing resource of published data.

Why is it important to publish "negative results"?

Most bench scientists intuitively understand the answer. Negative results are still revealing the underlying natural phenomena. As a result of human nature, we artificially tend not to report these results, and scientists are generally on-guard for things that can lead to bias in interpretation.

How can we move academics away from the view that research that doesn't give the results they want is "negative"?

My personal opinion is we are verging on a full-blown crisis in the scientific community. I read once in a book by Stephen Jay Gould, in one of his works on science history, that when scientists become too aloof from the society they live in, it hurts the individual researcher's own science. I think this is true. At the end of the day, as much as it is satisfying to receive accolades and reveal abstruse cosmic phenomena, modern science is meant to be a public good. If there is no longer trust between scientists and lay people, the system grinds to a halt. When the public hear about scientific fraud and irreproducible results, this chips away at this trust. Scientists should embrace all results, not just because it could be part of the professional ethos, but because the knowledge they create impacts the society they live in. Scientists don't pay attention to the results they publish at their own peril.

Does Scimpact help to challenge what some call the 'publish or perish' culture in academia?

Yes, our vision intends to allow recognition for all sorts of activities that are normally not recognized in conventional publishing. We are really interested in Project CRediT that grew out of joint industry and government involvement.

How important do you think it is for researchers to be able to publish early, easily, and rapidly?

Very important. In the academic apprenticeship system, an individual scientist develops her habits directly from the habits of her advisor. Allowing for positive feedback from generating, disseminating and discussing her own work can complement the formative apprenticeship.

How can tools like Scimpact work with platforms like ScienceOpen to foster a more open, sharing, research culture?

There is a lot of exciting activity in the area of open science. As I referred to the CRediT taxonomy, we have also spoken with people from Hypothes.is and eLife. It is an exciting time for all of these ideas and more. We are excited to contribute to this evolution of science communication.

How do you see the future of scholarly communication? What steps do we need to take to get there?

At the fundamental level, your earlier question hit the target: how do we change the engrained human behaviour surrounding scientific output, bound by conventional publication? Or, as I alluded to above, as the gap grows larger between the scientific elite and society at large, science becomes less useful and distrust sets in. Changing such behaviours is exceptionally hard, especially when left too long. I can't think, off the top of my head, of a super successful case. I strenuously support science education at all levels.

What one piece of advice would you give to students looking to pursue a research career?

Follow the science you find most interesting and enthralling—I use the last word, because you almost have to be compelled by your inner interest, to overcome a lot of the obstacles that can emerge. But, really, what area of life doesn't present significant obstacles? If it's too easy, you're missing out.

JACINTO DÁVILA

Figure 37. Credit: Jacinto Dávila

OPEN SCIENCE STARS: JACINTO DÁVILA AND OPEN ACCESS IN VENEZUELA

Hi Jacinto! Thanks for joining us here. Could you start off by letting us know a little bit about your background?

Hello Jon. I am a computational logician. That is probably a label, invented at Imperial College (*Ed: yay!*). So, I would add that I am System Engineer and also got a PhD in Logic from Imperial. But almost all my professional life has been spent teaching and doing research at Universidad de Los Andes, in Venezuela. Thus, I will call myself a computer scientist in the third world.

When did you first hear about open access and open science? What were your initial thoughts?

We had news of the rising movement back in 2005, thanks to Jean-Claude Guedón. I used to be at the computing academic board of my University and we got serious about it in 2006, submitting a proposal for our rector to sign the Berlin Declaration, which he did on October, 2006[1]. By then, we already had a fully operational repository[2], which have been up and running since 1995. We saw the open access initiative as a fantastic opportunity to level the game because we have historically suffered to have access to international results, which is always an expensive deal. We also thought, naively in retrospect¸ that just by going open we would have a fair chance of publishing our own work too.

As a Professor, how do you help your students to engage more with open research practices?

I openly (sometimes noisily) encourage them to use and write open access. I suppose that my grey hair helps me to enforce it when it comes to a joint work. But I can't force them to open their own work and I have certainly noticed fear and doubts. Some see it as unsustainable and, definitely, less prestigious or valuable.

How important is public knowledge, and building a good infrastructure for it, to you?

It is essential. In the third world we are dispersed, fragmented and underfunded. We rely heavily on public knowledge to feed our teaching and innovation practices. And, of course, as most of our universities are public, we have a moral and even a labour obligation to give our results back to the public. We can't do that without good infrastructure and, I believe, this could even explain why we are so bad at it.

Does Venezuela have a national open access policy? How does it work at the Universidad de Los Andes where you're based?

This is a painful question. No, it does not have one yet. But, we have done our best to pursue one. A big victory in that direction is the current info-government law (Ley de Infogobierno[3]) which establishes a firm policy in favour of free and open source technology in the public sector. This law even includes a definition for open access (I had something to do with it), but it does not go any further. We did launch a grass-root campaign to produce an Open Access

national law and we got to the point of having the project approved in a first discussion at the national assembly[4]. But that was before the parliament was renovated by a new election and the majority in the new assembly is openly hostile to the idea. I reported the efforts here (in Spanish)[5]. We failed, but the experience is extraordinary.

What role do the 'big five' publishers have in Venezuelan research, in your experience?

Well, they basically control prestige and still preserve a high level of control over promotion. Our universities clearly favour publications on their journals when it comes to acknowledge any effort. It is clear to me (now) that by this device they also control the research agenda in the country because my colleagues tend to align their work which whatever is publishable in those journals.

Venezuela is part of the SciELO publishing network. Do you find this is an efficient and useful way to publish research?

It is fantastic and very useful, but not very efficient because "the big-five" are still perceived as the best way to output our research.

What impact does the SciELO platform have on research assessment, if any?

It is still marginal. The government and some universities have tried to encourage these alternative means of publications but, again, they are perceived as of less quality or impact than those big-five's. We don't have a clear public mandate and this, essentially, means that every researcher chooses what she or he wants (or can) as a way to publish, even when they are fully funded by established public institutions, which should know better.

How much do you think places like Europe and North America could learn about publishing practices from Latin America? Why do you think we haven't built a SciELO-like platform just yet?

If the purpose of the great conversation of Science is to engage everyone for the benefits of all (as they taught in the old Europe), perhaps Europe and North America could learn, by looking at us, that the market-oriented strategy does not work. But this honest review is impossible, as long as the current practices keep benefiting the North by letting them set the research agenda for the whole world.

What do you think this says about different attitudes to things like public knowledge and copyright around the world?

Different attitudes have no chance. We have a system of conveniences that is threatening to eradicate any notion of public knowledge as a public good. Current globalized copyright laws are very good at it. We need to change the defaults views on sharing knowledge, at least for public works.

SciELO content was recently integrated into ScienceOpen. Is this a useful move do you think for Latin American research, and more broadly global research?

It is a very important movement. ScienceOpen keeps winning favour and support especially among the newer generations of researchers. This could help to change those perceptions on quality I mentioned before and will certainly help them to trust open access as a way to publish and share their results with themselves.

Where do you see the future of scholarly communication? What steps are needed to get there?

I am happy thinking that scholarly communication is evolving towards what we call modelling which, in turn, resembles the practices of coding in computing. The Internet is already a huge repository of knowledge in textual form but, if that trend stays, it will evolve into a fantastic space for active knowledge with machine assuming a more dynamic role in the production, diffusion and processing of information and knowledge itself. And I am glad this is so because the free, libre, open-source software community has already shown that by openly sharing that kind of knowledge, we get much better knowledge.

Whose responsibility do you think it is to lead this change?

We all, researchers and professionals, are responsible. Unfortunately, not many are aware. So, the minority has a more complex responsibility.

If you could give one piece of advice to students looking to pursue a research career, what would it be?

Try open access, compare and analyse the consequences. We believe it is the best solution. But a good scientist can establish this kind of conclusions, after a fair trial, by herself or himself.

Footnotes

[1] https://openaccess.mpg.de/319790/Signatories 181 02.10.2006 Universidad de Los Andes

[2] http://www.saber.ula.ve/

[3]http://webdelprofesor.ula.ve/ingenieria/jacinto/politica/manual-ley-infogobierno-venezuela.html (Spanish) info-government law of the Bolivarian Republic of Venezuela.

[4]https://docs.google.com/document/d/1ibhAIen0gfdfHbXNtWjBBCwjXkpGO4-WExp_AzOpIvg/edit (Spanish) Project for an open access and free distribution of knowledge

[5]http://tatuytv.org/index.php/analisis-y-opinion/memoria-libre/2468-memoria-libre-un-adverbio-por-la-libertad-de-conocimiento Un adverbio por la libertad de conocimiento

CHRIS HARTGERINK

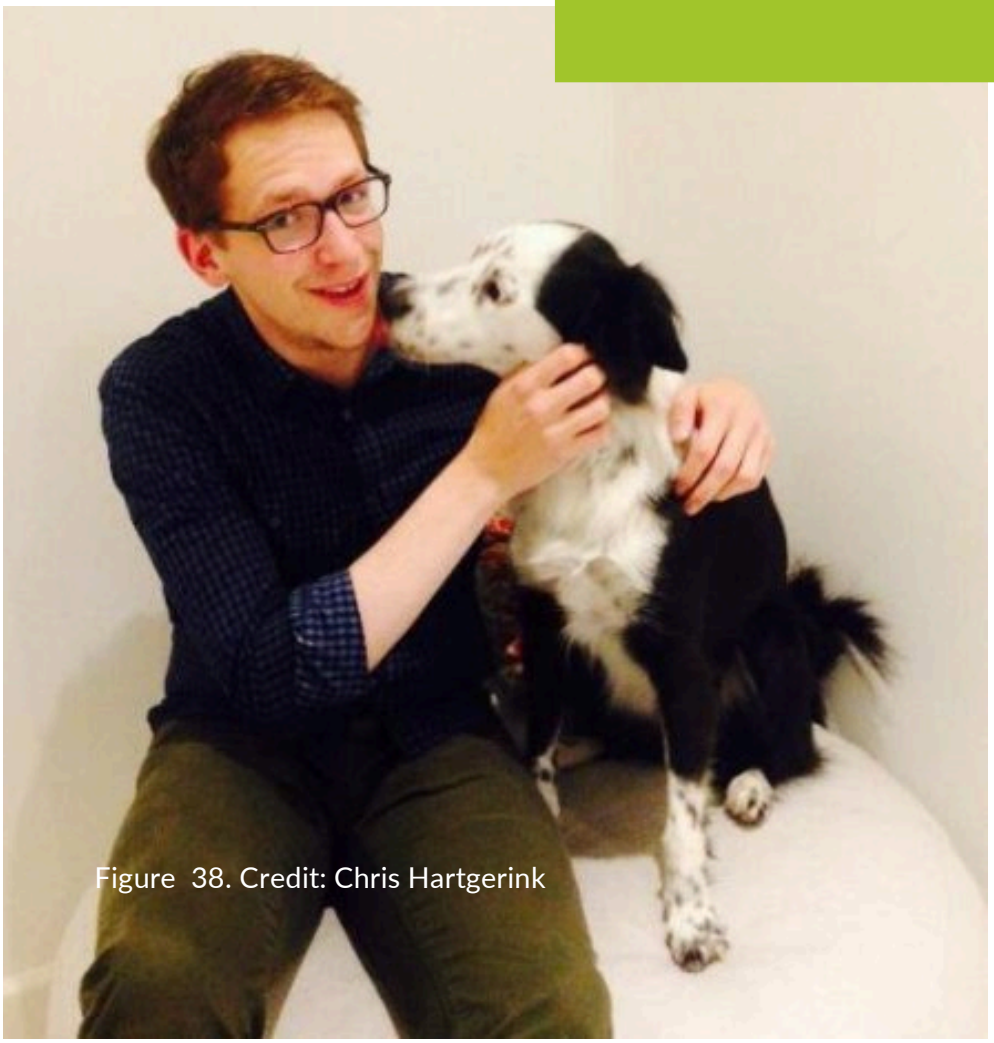


Figure 38. Credit: Chris Hartgerink

CHRIS HARTGERINK: A CHAMPION OF OPEN SCIENCE

Hey Chris! When did you first hear about 'open science'? What was your first reaction, do you remember?

I first heard about Open Science in late 2012/early 2013 during my Masters. My then supervisor (Jelte Wicherts) said to me, "Let's put all this online", and I remember thinking this seemed so obvious but that I simply hadn't considered it before – nor had I been taught about this during my education. This helped multiple puzzle pieces to fall into place. Since then transparent research has been central to all that I do. I also remember asking myself how to do this because it is non-trivial if you simply know nothing about it, and it has been a gradual process since then learning how to share in an easy-to-comprehend way. But it doesn't have to be perfect from the beginning because open science is more a way of approaching science than it is a checkmark.

What has inspired your dedication to open research? What sort of things do you do on a daily basis to commit to this?

To be honest, what you call dedication is an ethical responsibility in my eyes. The old, opaque way of doing science is based on the analogue age with severely outdated standards. This is irresponsible, just like a current-day astronomer using Galileo's antique telescope would be irresponsible. This antique telescope gives relatively imprecise measures compared to modern telescopes, so nobody would pay attention to new results based on it. I don't think the science done with the antique telescope in the old days is invalid, I just think we have to build on the old, create the new, and then use the new. Closed research, as you might call it, is stuck in the old. I would even go so far to say that such unnecessarily (!) closed research obfuscates science and can be deemed pseudo-science. I hardly pay attention to new research that is unverifiable.

By the way, when I say irresponsible, I mean irresponsible to others and to yourself. Our work is complex and making your work shareable and understandable to others helps others to understand what you did – including your future self. Transparent research has saved my skin repeatedly.

Your research is centred on data fabrication and fraud and the prevalence and impact of this on research. How did you get into this field, and what sort of things does this entail?

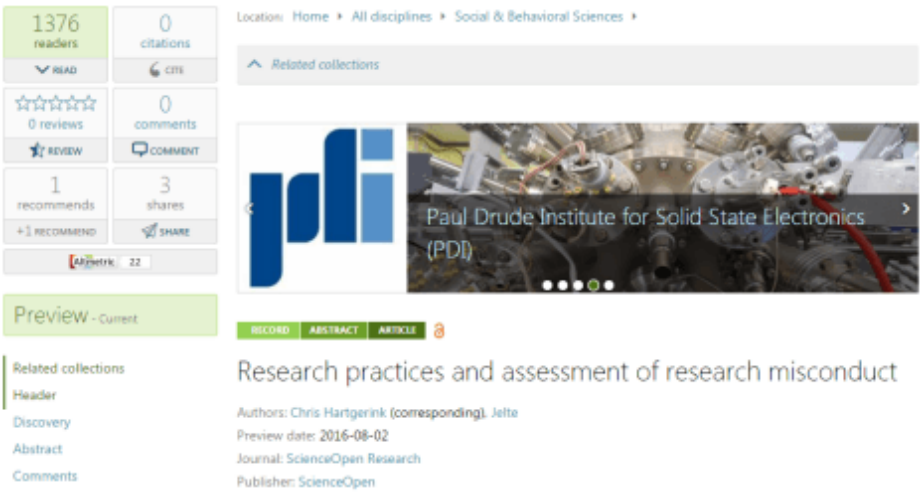
During my undergraduate years I majored in psychology and at one point I was employed as a research assistant to one of the (then unknown) largest science frauds in psychology. I was really inspired by him to go for an academic career. After he confessed to fraud, it caused somewhat of an existential crisis for my belief in science.

Open research helps the verifiability in science and has helped me regain trust in science as an endeavour. But I also wanted to contribute to help make science better and help scientists better understand how they conduct science. So when I was invited to join the Meta-Research group in Tilburg to work on detecting data fabrication, I immediately knew I found my topic given my drive to contribute and my history with scientific misconduct (I window shopped without success for a topic before).

Figure 39. Tilburg University campus (source)

You published a paper with us recently on best practices in research and assessment. Can you tell us what this was about?

This paper did not present new research, so in essence no new research was done. But it was the fruit of extensive reading on ethics, misconduct, and the grey kinds of behaviours in between. We discuss these topics frequently in our research group. It is easy to discuss scientific misconduct, but it is rather difficult to discuss good conduct. But during the discussions within our group, I came to the realization that the norms of responsible conduct of research in science scream transparency across the board. The paper gives readers a theoretical- and practical framework of doing responsible science, learn about grey practices, and learn about some of the intricacies of data fabrication/falsification. Of course, there is much more in the paper, so if these things I mentioned interest you, definitely go read it (especially if you disagree, and feel to review it and counter the propositions!).



How did you find the publication system at ScienceOpen too? And is there anything we can do to improve it?

Honestly, you were not my first choice! My co-author recommended me to write this as a chapter for a book to be published by the American Psychological Association (APA). Regretfully, they wanted all our copyright and did not want to negotiate about these conditions. After back-and-forth, they did not budge and I decided to pull my submission. I then thought ScienceOpen would be a good outlet, because I would not have to sign away our copyright nor would I have to pay the ridiculously high APCs or Open Access publication costs. ScienceOpen seemed like a reasonable choice, and I could use something reasonable after the unreasonable way the APA treated me for simply wanting to open up bilateral negotiations.

You recently published yet another paper on using content mining technology in psychology. How easy was it to perform this research, and what were the key findings of your study?

The technical infrastructure behind this project was overwhelming sometimes, but in the end open research has pushed me to make it as reproducible as possible and made it manageable as a project. Or in other words: without the open element of this project it would have been total chaos. The end result aren't key findings, but data to help people, including myself, answer research questions. It is one of the largest datasets I have ever produced and was approximately a year in the making. It would be arrogant of me to think I would be able to squeeze all the possible information out of it, and honestly, I don't want to bear that responsibility either.


preprints.org > behavioral sciences > other > doi: 10.20944/preprints201608.0191.v1

Preprint Data Descriptor Version 1 NOT YET PEER-REVIEWED

688,112 Statistical Results: Content Mining Psychology Articles for Statistical Test Results

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Version 1 : Received: 22 August 2016 / Approved: 23 August 2016 / Online: 23 August 2016 (10:33:53 CEST)

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How are publishers helping to aid or abet your work? Have you found differences in your treatment from different publishers at all?

Some publishers are agnostic and allow me to do my work as long as I don't cause their infrastructure to fail (they trust I won't until I do). Other publishers equate any content mining, which requires systematically downloading many papers, as copyright infringement and outright theft if you don't agree to their unilateral conditions (they seem to have systemic mistrust of anything out of their control, which I can understand given Sci-Hub but I don't think is reasonable). Other publishers encourage you to systematically download and mine their content because they want the research to be fully reused (these typically have the licenses that encourage reuse and sharing). So the behaviours publishers show with regards to content mining range from both ends of the spectrum: fully permissive and fully restrictive and much in between.

Why do you think content mining is so important to research?

Scientific output has not stopped growing and I think we all feel overwhelmed by the amount of information available that we might (!) need to know. It causes this fear of missing out, where a great paper might get drowned in an ocean of irrelevant papers. But how can we deal with this? Content mining helps us parse this amount of information that is simply unfeasible to have read by humans. Computers can read faster, and memorize better if we program to do so. It is maybe a matter of time before computers can even comprehend text better than humans. But regardless, computers are a great tool that is being denied use, or at least, is being made very difficult with legal threats going around. No wonder relatively few are using it and innovation is slower than it could be.

How important is open access to this, and where is the future of content mining?

Earlier I mentioned that certain publishers encourage content mining and that these typically have the licenses that encourage reuse and sharing. These are the Open Access publishers.

What is the importance of copyright law to your work? Do you ever find that copyright is actively used to prevent you from researching?

Copyright has become such a nuisance to my work I have been spending way too much time on it. I might have even become quite knowledgeable on its history and limitations even though I am a statistician.

I understand the original goal of copyright was to promote the production of creative works by allowing the rightsholders a temporary monopoly on selling it. And that original goal makes sense. Writers need to make a living, musicians do, and many other people employed in creative industries have to as well. They too have families to take care of.

But copyright in science? It makes no sense anymore. We can publish digitally, with infinite copies at such a low cost, but researchers still agree to sign away their copyright. I understand that copyright stimulated publishers to get into the sector in the analogue age (16^{th}-20^{th} century), but copyright has now become a tool that allows rightsholders (i.e., publishers) to reign over the science. Self-governance is one of the norms in science, but we hardly self-govern our communications.

Because of this, I decided in January 2016 that I will not sign away my copyright anymore and publish only in an open manner. Of course I feel that others should do too, because it will benefit us as a collective. It directly affects our ability to retake control of the knowledge commons we call science, and it directly affects how we develop science into the future, for example with content mining but also with the availability of knowledge.

How can we as a research community make sure that copyright is used in the best interests of teaching, education, and learning?

Copyright serves its purpose to stimulate creativity. But knowledge used in teaching, education, and learning, does not require copyright to stimulate production. First off, humans are inherently curious. But more importantly, researchers are already getting paid to produce

knowledge (also outside of universities). Communicating that knowledge is part of the job they are paid for. So copyright need not create a temporary monopoly for remuneration, because there is already remuneration in place.

I also remember we had to remove all our copyrighted learning materials from our digital learning environment several years ago, because we risked getting fined for copyright infringement. This does not serve education and learning. In the US this falls under fair use and is allowed, if I understand correctly. The European Commission is looking to make an exception for education as well. This is good news, but does not remove all problems. Books remain absurdly expensive to buy and inexpensive to produce.

So I think that the best (and maybe idealistic?) way is to contribute to open projects that benefit education, learning, teaching. These include contributing to OpenStax (free and open textbooks) and stop writing books that cost $100 to buy. But also in simply sharing their educational materials, as some do on the Open Science Framework.

If there is one thing I would recommend to anyone, is to think about these issues and where you stand. Determine your position (closed or open), justify your position to yourself and critically assess whether these reasons are logically sound. And yes, there are good reasons to close everything, but in my opinion these reasons are outshadowed by the good reasons to open up.

How important do you think communities like OpenCon are to advance science?

Essential. They connect people and create opportunities that otherwise would not be there. If it were not for OpenCon I probably would not have had the courage to stand up either. It has taught me that the problems in the world are not there by nature, but by our own doing. And our own doing we can adjust.

How can platforms like ScienceOpen help younger researchers develop their skills in open research? What other tools or platforms would you recommend to researchers?

My experience reviewing is limited, but my review on ScienceOpen was well received by the authors and helped us discover a mutual research interest. I think that peer reviewing frequently and in the open helps you develop your skills, because it also allows others to provide feedback and it helps you make reviews as objective as possible.

Other platforms I can recommend for open research are GitHub, because version control makes your life so much simpler. Many think it is difficult, but spend just 20 minutes walking through the introduction and you'll see the power that resides in version control and how it is key to open research. Github also has very easy desktop software. I helped another PhD get started last year, just a few weeks before a harddrive crashed. I've never seen someone so happy to use version control, but it's something you don't want to use until you wished you used it. So just get going, you'll thank yourself later.

Do you have any advice for younger researchers looking to start a career in academia?

Don't let anyone fool you with ill reasoning, because there is much going around.

MATTHEW PARTRIDGE

Figure 40. Matt assures me this a realistic representation of him..

A THOROUGHLY BRITISH INTERVIEW WITH MATTHEW PARTRIDGE

Hi Matt! Thanks for joining us. Could you tell us a bit about your background?

No problem, happy to be here! And by here I mean 'at my laptop 2 months after you sent me these questions, and several more weeks before it's published'…

I'm not sure what to tell you about my background really (your next question deals with the 'scientist' bit) so I guess I could fill you in on the non-science part of my backstory. I'm British and in my mid 30's and I currently work at Cranfield University – which is pretty much slap bang in the dead centre of England. My first degree is in BioChemistry, after which I spent 6 years toiling away in industrial medical device research. I then re-joined academia to do a PhD and have stayed ever since.

When did you first realise you wanted to be scientist? What was it that turned you?

I don't think there was a time when I didn't want to be a scientist. At various points in my life I've wanted to be various kinds of scientist – at one point even a pathologist. Both my parents were pharmacists so I was raised in a pretty pro-science house and it just appealed to me really. Although I did question it once when my science teacher wrote in final report (before moving to a bigger school) "Matthew should consider any career except science". Since finding this out a few years ago, I have strongly resisted the urge to mail him 1,000 copies of my PhD thesis.

When did you first hear about Open Access and Open Science? What did you first think?

It was when I was working in industry and had a huge need for open access. I survived on borrowed university accounts and e-mailing authors to get papers. Once I actually travelled to the British library just to get a paper we needed. It was a massive pain. Although, other than being annoyed and frustrated, I wasn't really aware of Open Access or Open Science as campaigns, more just ideas that seemed neat and that there were people arguing for it but little actual progress.

Since returning to academia, I've always been a big proponent of openness and sharing of data and information. I published all the data from my PhD online, and always publish any data set that I use in either a paper or presentation so that it's available to anyone when they see my work.

What do you think the biggest problem with the current scholarly publishing system is?

I think the biggest problem is that there are two problems. There is also the third problem of people deliberately bending questions to their own ends but that's more a problem with this interviewee rather than publishing.

1 – Big publishers are for-profit companies that have found a near perfect business model to print money and are cranking the handle for all their worth. The nature of journals and their prestige means that they are effective mini-monopolies that can do basically whatever they like. There is no Methadone for profit addiction. The model for publishing started out pretty balanced but there is zero regulation beyond 'the market' and it's just not working for anyone

but the publishers and their investors. They are changing, but very, very slowly and it's not going to speed up unless someone discovers a way that they can make huge profits from making everything they do free.

2. n+1 solutions and more publishing 'competition' are creating different problems. We are moving to OA, it's going to happen. But how we do that and where we exactly end up is still up for grabs – and boy, are people grabbing. There is a great XKCD cartoon about why there are so many 'standards' all spawned from people trying to 'solve' the previous standard. The same is true in publishing. The current system is changing and it has opened up a hole for companies to start trying their own brand of publishing and open access.

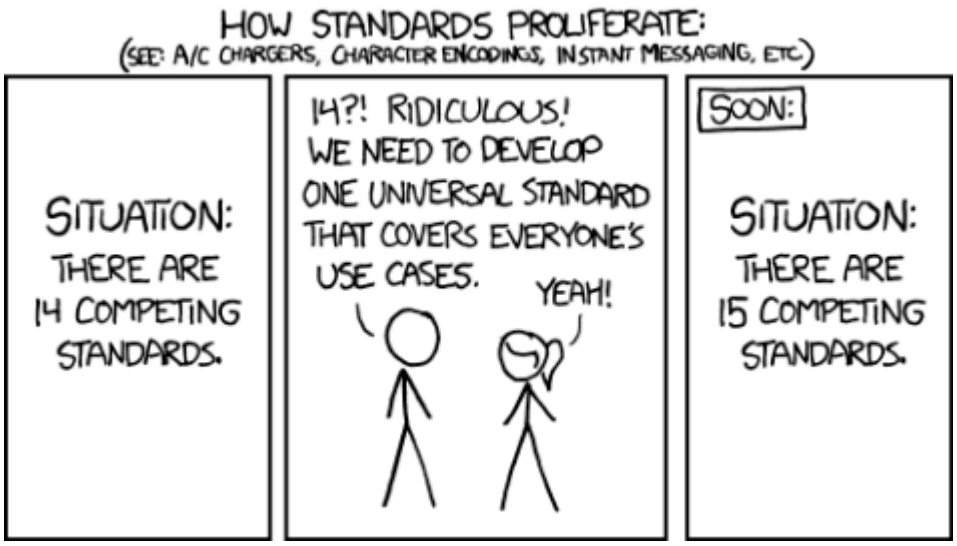


Figure 41. So what you're saying is we need more standards in publishing? (Source)

This is great because competition is exactly what the big profit-making journals need but with every passing year there are more and more alternative metrics, peer review systems and publishing models. I know many academics who are giving up on trying a more OA approach simply because they are utterly baffled by the plethora of people claiming that 'THIS' is the next thing. I'm a pretty keen early-adopter and I love trying new things and even I'm getting a bit burnt out on open access 'solutions'.

I'm also not convinced that these new players aren't just little baby profit-addicted publishing companies in the making. They are just riding the current trend on their way to the big league of profit cranking.

As a researcher, what barriers have you faced in your work? And how have you overcome them?

I live a charmed life, the barriers to my work are relatively small and mainly just funding, finding sympathetic people willing to let me try new things. I have a crippling allergy to doing things because "that's the way we've always done them" so I spend a lot of time annoying people in meetings by insisting that we rethink about procedures they've been doing their way for decades. So I'm going to say my biggest barrier is myself being argumentative.

What do you think the biggest system-wide barriers to the different aspects of open science are?

Money. Your research has value to the publishers. They can charge for it because people will pay. Unless someone can cure publishers of their crippling addition to regular infusions of cold hard cash that is never going to change. Although, they are mindful (at least a little) to their public image and I suspect that they'll find a way to keep up the addiction and slowly move to Open Access, as many have already done. Different funders and employers also add their own particular brand of complications.

Do you think this differs between UK institutes and others around the world?

Obviously the biggest impact on OA is government policy and how much impact policy has on institutions. This varies hugely between countries and institutions. The issue of journals being money addicts is worldwide (as are the publishers) but in many other countries there are other barriers even before getting to the evil tentacle like profit fuelled influence of the publishers.

What do you think about Open Access policies in the UK, such as the new HEFCE policy to deposit author-accepted manuscripts within 3 months of publication?

A good idea that in essence I don't think many people would disagree with. There are some issues about exactly how it works and some technicalities but basically it's all good.

Why do you think the UK also seems to have a preference towards 'Gold Open Access' along with using institutional repositories?

Gold is of course the err gold standard. I think public opinion has persuaded the political powers that if the UK public are footing the bill the UK public should get to read the papers. Anything else might have been seen as a bit of a cop out by the research council. Also there's not always a huge fee difference between green and gold and so it would be little grant saving. Journals have of course embraced this as it means they were suddenly getting lots of sweet government money to make all these paper gold with exorbitant fees.

How has blogging influenced your career as a scientist?

I've posted a ~800 word blog post every Wednesday for 3 years now and every single one of those blog posts has had an impact on my career in terms of what I do and how I work. The conversations with other scientists, members of the public and even my students around my blog has been highly influential to my methods. On top of that I've got funding, papers, collaborations and even students simply because I blog.

Do you feel that social media in general has been useful in learning about 'the world of open'?

Yes and no. It's helped me find people that can help me be more open, and it's been fantastic for finding open science tools. However, like any online argument/campaign Open Access has proponents that are as unpalatable to listen to as the profit pumping journals themselves.

I've seen Open Access advocates publicly insult and berate new young researchers because they are publishing in the 'wrong' journal. I myself have been told that I am 'part of the problem' as I have published in some mainstream journals (all paid to be gold). People feel

very strongly about Open Access which is clear but like any passionate community, some people can go too far. And social media amplifies those voices brilliantly.

Social media is very important and there are some very supportive people out there. My advice is to focus on them, and try to steer clear of anyone who starts discussing getting an Open Access tattoo and possible changing their name to CC-BY.

Do you think that engagement through social media should be factored into scholarly evaluation systems?

Yes and no.

Yes, social media is becoming even more important in the way scientists communicate and the connections and work they do. And I think the work scientists do to publicly disseminate their research should be rewarded.

But no, because it's practically impossible. If you were to ask me to look at my Twitter timeline and rate each month and give it some kind of value I wouldn't even know where to start. There is no sensible way to look objectively at that content and say what is good and bad and what is productive for future assessment. From time to time, there are things that are significant to point at and say "that thing there, that did X which led to Y which led to £££" but those are both rarely that simple and just plain rare.

However, I should point out that a system of sorts does actually already exist. REF includes the much loved 'impact' statements. While it's certainly not common, I have talked to scientists who have included impact via social media as part of one of these statements. Also, in research council grants there is a specific need for engagement and public dissemination and I myself have used a blog as the proposed vehicle (something which was praised by the RC in question).

So to some extent it really already exists in some form, and will get better as more people take advantage of it.

What impact do you think open science has had on evaluation? What impact do you think it could have in the future?

I don't think OA has had much impact on evaluation of research. Mostly evaluation happens within the University system and so access was there already. OA isn't really about evaluation it's about reaching people who aren't inside that system.

Where do you see the future of scholarly publishing? And what steps do we need to take to get there?

I don't know. I really don't.

Open Access is going to happen slowly but surely and it's a fight that the publishers will lose. However, there's still the question of the data used in papers, which has a LOT more implementation issues than Open Access but is also something that needs to happen.

I hope that we move to more public funded publishing. I'd love to see a journal of "EPSRC", "NERC" or "Wellcome" where all the research done on grants from those bodies is published

OA. Then, instead of journals being a collection of papers they published, they could be curated aggregations of papers in fields which are published in large mixed OA repositories. But that is a serious change and would require a massive shift in the way people read and disseminate papers.

If you could give one piece of advice to a student wishing to start a research career, what would it be?

If you believe in open access and open data don't be beaten down by the system. Keep trying and keep asking. But realise that you are one voice and the best you can do is to always ask. Not every paper will end up where you want it, and that's okay. Don't give up, but also don't martyr your career for the sake of a single publication. If you don't get to publish it Open Access then ask again next time and the next time and the next time.

XUAN YU

Figure 42. Credit: Xuan Yu

XUAN YU, A MAN WITH A MASSION TO BRING OPEN SCIENCE TO THE EARTH

[SCIENCES]

Hi Xuan! When did you first hear about 'open science'? What was your first reaction, do you remember?

When I joined the OntoSoft committee meeting in March, 2015, I was introduced the concept of 'open science'. I was not convinced by the concept, because there are usually many individual preference-based methods involved in most of geoscience projects.

It seems like much of the global push for open science comes from the Life Sciences. How are things in the Earth Sciences in terms of awareness and solutions?

Earth Sciences are slowing moving towards transparent, reproducible, and open culture. Many funding agencies and publishers have made actions to promote open science.

Can you tell us about some of the strategies you've developed for sharing data and software in geoscience? What drives your commitment to this?

I would like to recommend the strategy of transparent publication in geoscience. Sharing data and software with journal articles will draw wide attention and be practical. Because: 1) background information about the data and software has been explained in the article, which increases data transparency, 2) a scientific story in the article will lead readers to the data and software, which promotes the utility of the data. Specifically, there are four key steps in transparent publication of geoscience: persistent, linked, user-friendly, and sustainable (PLUS).

- *Persistent*: Data, software, and authors should be persistently (i.e., consistently) identifiable. The process of the research (including data and software) should be assigned with persistent unique identifiers (e.g., data and software can be uploaded to online repositories with DOIs or PURLs (Permanent Uniform Resource Identifiers)).
- *Linked*: Data and software should be linked in the computational workflow so that the software can be understood and reused by the readers. These links should include any intermediate data derived from the original data that represent essential information in the final figures of the article.
- *User-friendly*: The software should be packaged with documentation and instructions so that readers can decide if the software can be reused in their work, and, if applicable, know how to apply it. It is important to be mindful of your audience and consider cross-disciplinary readers.
- *Sustainable*: Authors are recommended to register an ORCID (Open Researcher and Contributor ID), so that readers can track research updates. Software should be maintained at repositories (e.g., GitHub, CRAN, and CodePlex) so that further development can be achieved (e.g., users will be notified when the software is updated and authors will receive suggestions and comments regarding next version of the software).

A reader asked me about data and code in one of my previously published papers. And then he doubted the reproducibility of the results shown in the paper. I spent more than 3 months

to guide him through each data processing pipeline to reproduce the final results. To avoid such problems in future publications, I decided to pay attention to transparency and reproducibility in the preparation of my future manuscripts.

How has the research community generally responded to this progressive action from you?

There are diverse responses. Some scholars agreed it is good practice to explore possible solutions for research reproducibility. Some scholars argued that it is difficult to apply widely across the scientific community.

Do you have any advice for researchers wishing to engage their communities with open research practices?

Try to promote open research practices among different levels of scientists, different communities according to their roles (e.g. publisher, funding agencies, conferences.), and different disciplines. When the engaging target is specified, it will be easier to develop and implement practices.

How important is open sharing of data in research aspects such as hydrology and other aspects of Earth system research? Why would there be any resistance to sharing in these fields?

Hydrologic data and models are important for researchers. We often ask corresponding authors for data and models to test our new methods or hypotheses. Sharing data and models require time and effort to explain the meaning and processing pipelines. Sometimes, research institutions or funding agencies have different policies on data and model sharing.

What are the biggest barriers to open science in the Earth Sciences? And how can we help overcome these?

First the practice is not clear. We need to inspire the motivation and incentive of open science and then develop best practices applicable in each discipline.

How can we engage younger generations in these issues, and get them invested in open research at an earlier age?

I don't know. [*Ed*: *Appreciate the honesty! It's a difficult question.*]

You've given numerous talks about open science all across the USA. Has the response to these generally been positive?

No, there are both concerns and agreements.

What are the key messages that you try and communicate about open science?

I tried to convey that research facilities and methods are changing, funding agencies and journals are change, therefore, it's the perfect time to think about open science.

How can platforms like ScienceOpen help younger researchers develop their skills in open research? What other tools or platforms would you recommend to researchers?

It is good to provide latest information on open research for each discipline. Maybe launch some programs or competitions to increase the involvements and experiences on open research.

Where do you see the future of scholarly communication? What steps are needed to get there?

The future of scholarly communication should be adapted to the requirement of researchers and development of modern technology. First, we need to inspire each researcher pay attention to the effectiveness of scholarly communication. Second, we need to bring discussions between communication professionals and research scientists to guide and develop the future of scholarly communication

Whose responsibility do you think it is to lead this change?

Maybe the funding agencies should take the leading role.

Do you have any advice for younger researchers looking to start a career in academia?

No. But I do need advice for how to start a career in academia.

DASPATA ERWIN ARAWAN

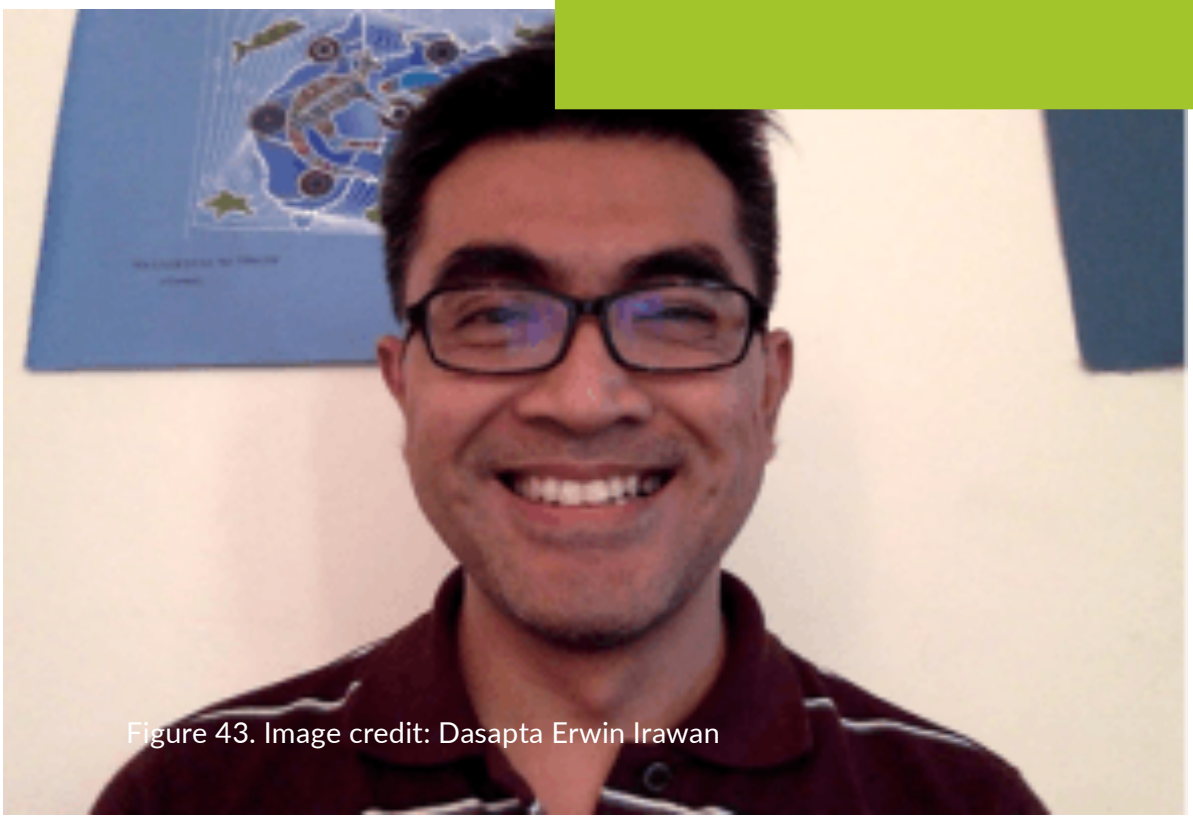


Figure 43. Image credit: Dasapta Erwin Irawan

DASAPTA ERWIN IRAWAN: THE STATE OF OPEN SCIENCE IN INDONESIA AND HOW TO DRIVE CHANGE TO MAKE RESEARCH BETTER FOR EVERYONE

Hi Dasapta! When did you first hear about 'open science'? What was your first reaction, do you remember?

It's kind of funny, I heard it first from you :). (*Ed: *sniff**) It was one of your blog post in 2012 Relocation, and a chance to try some open science-ing that gave me ideas of sharing my results as fast as I can and as wide as I can. I had finished my PhD when I first read it and your posts on EGU blog. There I noticed your hash tags '#OpenPhD` then followed it. I wasn't serious in using my Twitter handle for academic purposes back then. My first reaction was, to make all my published papers available online, posted them all on my ResearchGate account and my blog.

You have a very strong commitment to open science. What is it that drives this for you?

My strong commitment has been built by seeing so many other doing the same thing. In Indonesia, where not many universities have subscription to major journals, open science could be the answer of what we've been looking for. Everybody here keeps saying to submit papers to major paywalled journals, as they have good reputation and indexed by WoS or Scopus, while it should not be that way. What we need in Indonesia is to keep writing, write more in English and find a way to make it easier to be found and accessible by others, as if it was indexed by WoS and Scopus. And I see by using the latest free and open source services, we can do that.

You've been an absolute superstar in interacting with ScienceOpen (SO). How have you found the experience so far? How can we help improve it?

Just get started in this, so it's not a superstar yet (*Ed: stop being modest!*). But I've been self-evaluating the SO model and find that more Indonesian scientists should use this model to publish their research. I organize a monthly meeting to talk about many sides of open science, and the response is surprisingly overwhelming. I can reach out to many scientists from every corner of Indonesia, saying that the government (Ministry of Higher Education) have built a completely wrong model to nourish the scientific climate in Indonesia. They are all very amazed by the SO model, along with other new journals like PeerJ, F1000Research, and Rio Journal.

You published recently with us a paper about the fossils and geology of East Java. Why did you choose to publish this research with us, and how did you find the experience?

Actually Palaeontology was my long lost passion :). So I have to get it published to journal with the same passion to actively spread the news. I believe that scientific outreach should not be solely done by the author/s but also the journal team. I find them all in SO. My second paper will talk about hot water classifications based on their hydrochemistry, using open source tools, like R and Orange. Hopefully I can send it next month.

You've also performed several post-publication peer reviews on ScienceOpen. How did you find the experience, and why did you choose to do this?

It was very easy and worth to try, because SO has stepped forward to acknowledge peer-reviews. I hope SO can team up with Publons to display SO reviews directly to Publons profile. (*Ed: we do this already!*)

What do you think about open peer review in general? Should referees and reports be made public? Should the whole process be open so that anyone can be included?

Yes off course, that way not only the author/s, but the readers can also read the report and make more suggestions and corrections to improve the paper or research.

What is your experience like as a researcher in Indonesia? Is open science high up on the agenda there?

Open science is not one the priority here, but it's coming, but I am really really sure that we can rapidly shift the environment to open science with more communications. Once more and more of society know about open science, then it will grow fast.

How has the research community in Indonesia responded to the global push for open access? Are there policies in place or being developed?

Yes some policies are in the making right now, in national level or regional level, I however, am currently advocating for groundwater law at city level, including how we can share the groundwater measurement data to public. So it's on its way, with more sustained efforts.

What is the scholarly publishing ecosystem like in Indonesia? Do people care much about things like journal branding and impact factors?

Well this is interesting, since most journals in Indonesia are open access, and most of the APCs (article-processing charges) are waived by the journal editors because journals are usually affiliated with certain ministry of government office. Therefore the operational costs are included in the office expenses. Even with that condition, it's only bringing a few authors/papers each year. Many papers are written in Indonesian language, so we have to increase English language papers for more impact.

Yes people still care (too) much about journal branding, index, and impact factors. But we are slowly bringing them to this more open environment.

What has your personal experience been like advocating for open science? Do you find researchers are more receptive or resistant?

Most of them are receptive. However they (mostly lecturers) still have many questions and doubts about our ministry rules that still too Scopus/WoS-minded. To advocate them, I always suggest them to have all results open and to also post their paywalled/Scopus indexed papers in preprint servers, open repositories or just self-archive the papers in any way they familiar with, like Google Drive or a WordPress blog.

How can platforms like ScienceOpen help younger researchers develop their skills in open research? What other tools or platforms would you recommend to researchers?

Yes definitely, from my experience, not only delivers fast publication, ScienceOpen and the ScienceOpen team can boost the confidence of young/early career researchers. The SO team has made the social media as ultimate tools to disseminate academic outputs.

To maximize research impact I recommend researchers (especially in Indonesia and other SE countries) to use: ORCID as scientific online profile, preprints servers to host their in review papers, free repositories like the OSF, Figshare and Zenodo as their project folders, collaborative writing tools like Overleaf or Authorea, and also Publons to deposit reviews.

Where do you see the future of scholarly communication? What steps are needed to get there?

I see that the future of scholarly communication shifts to more:

1. **Digital**: digital version of paper must be available and accessible for others;
2. **Open**: to make data and methods open is essential;
3. **Global**: academics from any non-English speaking country (like Indonesia) should learn hard and force themselves to write and speak in English;
4. **Collaborative**: one should make more network not only for casual research chats, but also for hard science;
5. **Civilized**: scientific communication is not political debate: it should be objective, direct (email is not a very direct tool for communication, but Twitter does), and polite.

To achieve that we need to have more dissemination about open science and open government data, then we can start drafting regulations based on actual problems, from down to top.

Whose responsibility do you think it is to lead this change?

Every researchers, lecturers, students, any member of the academic world can work their part to lead to this change.

Do you have any advice for younger researchers looking to start a career in academia?

I'd tell to them to write early and frequently :). They can move forward to make their research and papers more open to everyone rather than keep their narrow minds about indexes and impact factors.

SAMIR HACHANI

Figure 44. Credit: Samir Hachani

THE STATE OF OPEN IN ALGERIA: AN IN-DEPTH VIEW WITH SAMIR HACHANI

Hi Samir! Can you tell us a little about your background as a researcher and your current role?

I'm Samir Hachani, lecturer at the school of library science, Algiers University II. I hold a PhD in Library Science from Algiers University II and a Master degree from The University of Southern California (U.S.C.) – Los Angeles. I hold positions in numerous scientific organisations but my main role, besides my teaching duties, is being Vice President of "Association Science et Bien Commun", based in Quebec (Canada) and whose motto is "*For an open science, for the common good*". We militate in this association for a just and open share of science and an empowerment of the research in The Souths (we use the plural because we think the South is not uniformly made up and there are many level of developing countries) through our flagship program S.O.H.A. (Science Ouverte Haiti Afrique – Open Science Haiti Africa). My main research interests centre around open access, open science, open peer review and also digital divide.

When did you first hear about Open Access and Open Science? What was your first thought?

I first heard about open access some 10-15 years ago when I started investigating my thesis subject and I almost instantly got interested in the subject because the philosophy behind the concept was quite simple and enthralling: give access to knowledge produced by researchers or plain folks to these same people through The Internet. I first heard about open science much later (around 2010). My first impression was that I had to commit myself to the movement because it describes what I have always felt about life: sharing is paramount to make the world fair and equitable and there should not be a difference in accessing knowledge between the "have" and "have not".

What is the current status of Open Access development in Algeria? Is there a national-scale policy in place?

It is sad to say that open access in Algeria is in dire situation. This is due to numerous reasons the UNESCO's Global Open Access Portal summarizes in: "*Lack of information on Open Access, the concept is new and not popularized enough thus implementation is not rapid, lack of clear institutional and national policy on Open Access, difficulty of securing long-term funding and getting commitments from more institutions to join the open access community*". As a practitioner speaking from the field, I could add a very weak and unstable Internet connection, a weak bandwidth (upload and download) and a rather restrictive national policy regarding telecommunications that are still public and have not been privatized. It seems that the concept itself is ignored and as an example, I conducted a questionnaire on the subject of open archives use and one of the answers was that researchers used "archives of the colonial period"!!! There is no clear policy on the subject as it is ignored and the only initiatives are those undertaken in the academic world.

Is there a wide understanding of the issues around Open Science and Scholarly Publishing among the research community in Algeria?

No. There seem to be disinterestedness in the subject as scholarly publishing has not been traditionally a stepping stone to academic advancement and academics have always managed their career without the famous "publish or perish" Damocles' sword. I should say that this is changing as the Ministry of Higher Education is putting new criteria for advancement that will compel academics to publish. As for open science, the ignorance is even bigger and I personally think the reason stems from the ignorance open access is victim of. I have already talked of this situation and there does not seem, for the time being at least, an awareness of the issue. We have proposed relentlessly that the concept be introduced in the academic curricula and that courses pertaining to the subject be introduced but to no avail.

How well connected are the various stakeholders, such as librarians, researchers, and publishers, within the OA movement in Algeria?

Again the different stakeholders do not seem to see open access and open science as THE solution. I have always defended the idea that open access is a boon to the developing world more than for the developed world pending on a decent internet connection and an awareness of the benefits this medium could bring. At the national level, and in consequence of the different initiatives, only librarians seem to be aware of the benefit open access and open science could yield. For example, the overwhelming majority of open archives (either in DOAR or ROAR) are academic but researchers do not seem to trust nor even know the concept, a fact the questionnaire in my thesis confirmed. Lastly, publishers be it academic or commercial are not interested (a word used by a commercial publisher I proposed to go digital) in the Internet, a fact confirmed by the little number of publishers having a website. Due to backward approach, Algerian publishers (both academic and commercial) act as book sellers rather than publishers as the concept is traditionally known.

What would you say the main problem for researchers is in Algeria regarding scholarly communications? How can we all help to combat that?

I would say the main problem in Algeria for researchers and regarding scholarly communication is the quasi absence of incentive to publish and publish good science. Researchers do not generally have the culture of publishing since their first year at the university as it is the case in western institutions. One publishes circumstantially to access tenure or a higher rank in the hierarchy and not to advance and achieve progress in their field. The reason is the system that insures a lifetime job to people who have a Master's or a PhD. The solution would be more selective criteria for university entrance (there is actually 1.5 million students in Algerian universities and higher study institutions for a population of 40,641,757) that would yield a more selective output from Algerian universities and whose ranking in different sites is not very brilliant.

Is there a role that ScienceOpen can play in helping researchers in Algeria?

ScienceOpen a well-known and respected organisation could do a lot to help researchers in introducing the concepts of openness which, as I repeatedly pointed out, are quite unknown. It can organize workshops, conferences and webinars that could open up the researchers' minds to the idea that science in an increasingly connected world could and should not be closed. I personally would be more than glad to contribute. (*Ed: Awesome!*)

How well equipped are libraries in Algeria to tackle the challenges of access to research and publishing in the current age?

Algerian libraries are the reflection of research in the country's educational system. As I said before, I personally think the big challenge lies in the number of students and the lack of qualified supervising. It looks like the library profession is in a limbo and the best example is the National Library which has been with no Director for over a year and before that for over two years. As a result, all libraries do not seem to be ready to undertake the transit towards the current ways of doing and disseminating science.

Is there much scope for training in peer review at institutes in Algeria? Are researchers open to the idea of open peer review?

The idea of peer review itself is practically unknown. I say practically because, as I said previously, publishing has not been up to a recent past, a way used to advance in one's career. Academic careers have been managed as "publish to advance" and not "publish to discover new horizons". There were no incentives to publish but publishing was a done at a minimum to further careers. As a result of this, the idea of peer review itself becomes secondary as an old boys' networks furthers one's the other agenda by accepting articles that are to say the least not worthy of publishing. As an example, if a researcher wants to present an article to get advancement, they should publish in a list of (Algerian) journals given to them by the Ministry of Higher Education and Scientific Research. Any other title (be it Nature, Science, or the Lancet) will be rejected. These journals are all local and serve only to advance one's career and not science. I personally had an article submitted to "Advances in Librarianship" rejected because the title was not recognized by the Ministry. Another article published in the faculty's journal was accepted. Speaking in this case of open peer review is simply ridiculous. Through my research interests, I have approached colleagues investigating their views on open peer review and they did not even know what I was talking about.

Repositories in Africa seem to be taking off due to initiatives like OpenDOAR. Do you think these are successful in opening up access to research?

Research has proven that open archives or the green road is the best "road" for the Souths of which Africa is a part. This is mainly due to the fact that the golden road is rather expensive due to the Author Processing Charges (APCs) asked by some publishers (some of which could reach $5000!!). Open archives especially those in academic settings are rather easier to implement and do not come with author rights criteria, the researcher being sometimes compelled (through a mandate) to deposit their research in the institutional repositories. Algerian academic institutions with 07 and 13 repositories in ROAR and DOAR, respectively, seem to have grasped the importance of these tools to showcase their scientific output. Through my numerous attendance of conferences, I have felt an awakening of the Souths to this new way of opening up research though the percentage are not that encouraging (Africa make up only of 04 % in DOAR and 03 % in ROAR of the total of world repositories).

Why do you think African nations seem to prefer the self-archiving or 'green' route to Open Access compared to many western nations?

The reason is simply the false idea that publishing open access equates paying Author Processing Charges which are simply prohibitive for an African researcher. His or her situation does not allow him or her to pay to be published. Though this is a somehow false idea (many serious publishers do not charge for publication and there are waivers for researchers from the Souths) it is compounded by the widely widespread idea that the Internet is not a “serious” medium to publish in.

Where do you envision the future of scholarly communications? What steps do we need to take to get there?

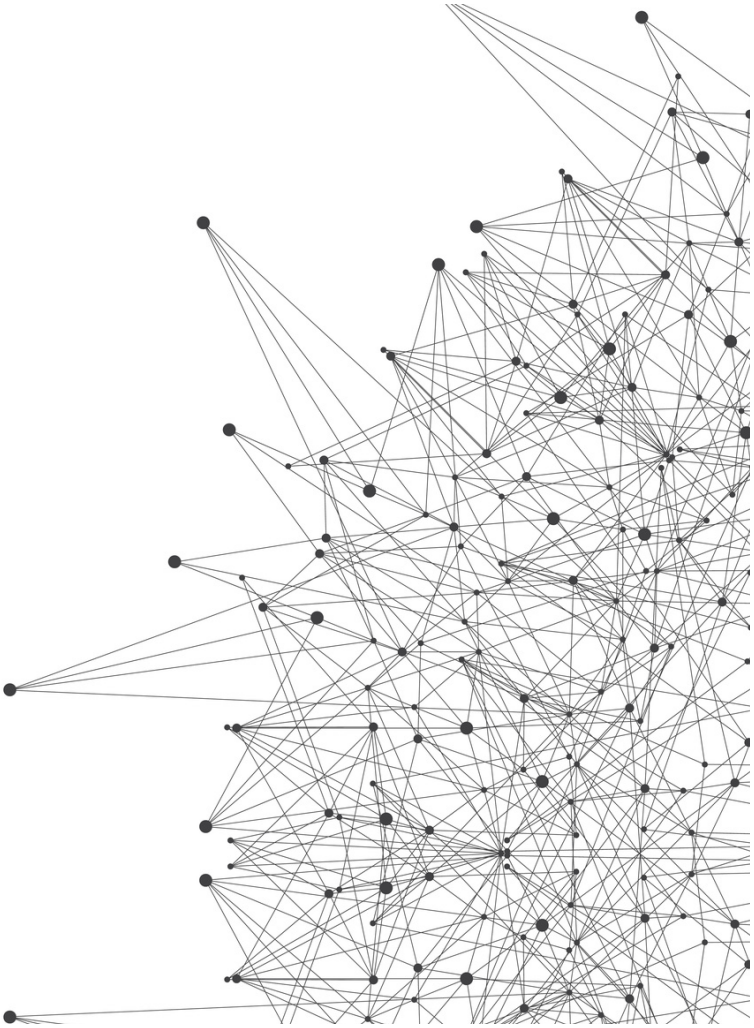
It would be tautological to say scholarly communication is going through a complete and radical upheaval. The developments are so rapid that we have not digested one another one hits us. As a researcher from The Souths, I see these developments as an irreplaceable opportunity to catch up with North. For years, the paper made the flow of information hard and one way: the new settings offer opportunities that will make the scholarly communication a more just and equalitarian “game” if everybody pitches in. I have attended conferences and workshops in the West (United States, Canada, and France) and I was able to convey my own point of view thanks to the opportunities the networks have afforded me. The key words for the future of scholarly communication are openness, connection and sharing and we should all contribute and give without waiting for something in return: it will come undoubtedly in a form or another.

If you could give one piece of advice to students looking to make a career in research, what would it be?

Be yourself, be honest, be patient, try always to do your job the best you can and do not see in a career in research the way to get rich. The wealth you will gain is much more gratifying and endless: you will be able to contribute to advance Humanity and not your own (small) person.

GRAHAM STEEL

SOURCE



HOW TO START AN OPEN SCIENCE REVOLUTION! AN INTERVIEW WITH PATIENT ADVOCATE, GRAHAM STEEL

Hi Graham, and thanks for joining us here! Could you start off by letting us know a little bit about your background?

For 25 years, my background (as in day job) was dealing with insurance claims for various insurers, legal firms and service providers. In my spare time as of around 2001, I became involved in research/science outreach and as of now, I would class myself as an open science enthusiast. From Jan 2015 – August 2016, I acted as Community Manager (then Social Media Manager) for ContentMine.

When did you first hear about open access/data/science? What were your initial thoughts?

In order, I first heard about open access late 2006, open science the following year and then open data. My initial thoughts were that all these entities were much needed and refreshing alternatives to all that I had seen or read about such topics up until then, i.e., closed access, prohibitive paywalls, "data not shown" etc.

You're what some people call a 'Patient Advocate' – what is that, and what's the story there?

The terms Patient Advocate and Patient Advocacy broadly speaking can mean a number of things. By definition, *"Patient advocacy is an area of lay specialization in health care concerned with advocacy for patients, survivors, and carers"*. For myself personally, this began in 2001 and mainly concerned bereaved relatives and then patients and their family members. See here for further details.

You relentlessly campaign for various aspects of open science – what drives you in this?

My means of background, I would say with certainty that during the period of around 2008 – 2011, the (sadly now deceased) social media aggregator site Friendfeed was the space in which the foundations for a lot of my current thinking were set out. Prior to that, having already been primed with open access and open data, that's pretty much where open science really took off in earnest. Science and indeed research in the open is without question the way forward for all.

You're not exactly silent in your angst against some publishers for their business practices. What are the major issues that you have here?

With regards to the "angst" you mention, I have been become a more mature/level headed individual these days in this respect compared to a few years ago. Looking through my blog posts over the years, these have mainly been about 'pro open' issues rather than 'bashing certain publishers'. As a prolific tweeter though, I may have put out <ahem> 'a few' ones where I have not exactly been 'silent' as you say.

How does social media play a role in your daily activities as an open advocate?

What is this thing called social media that you mention? Having joined Twitter in January 2008, initially I didn't use it that much but that has certainly changed over time. "@McDawg posts an average of 53.51 tweets per day" according to one of many free online tools. Social media is pretty much essential for what I and many others do pretty much every day.

How does open access play into the bigger picture of open knowledge and open culture?

Great question! Firstly, I thought about a comment (in part) I made in an interview back in 2012. *"OA itself however is just one cog (but a significant one) in the wheel of Open Science!!"* In my mind, I don't think it's easy to 'timeline' as you were the onset and development of all things open. I've not studied free/open culture in vast detail myself. A good source in this area (not surprisingly) is Lawrence Lessig. See here for details. The history of open access dates back to around the 1950s. When ArXiv.org started in 1991 that was the precursor to what we know as open access today. In short, I would say that open access is a foundation stone to the grander scheme of things.

You're a major player in communities such as OpenCon – what position do you think these play in the development of open initiatives across the planet?

I think it's important to have a number of open communities/initiatives across the planet and that there should be synergy between them wherever possible. Specifically, OpenCon *"was convened in response to incredible desire from the next generation to advance these issues."* [Open Access, Open Data, and Open Education]. Other than the annual OpenCon event which has taken place every year since 2014, the community hold regular calls online (open to anyone with an internet connection) as well as many satellite events around the planet before, during and after the main event each year. I am extremely encouraged by such activities.

You once said at SpotOn London that getting younger students and researchers to practice open science was the real revolution – what did you mean by this?

What I meant by that is reflected by the answer to it. In context, that was a short comment I made when live-streaming a Panel Discussion, *"What do you need to start a revolution?"* in 2012 in London. VIDEO. Transcript of what I said:- *"A question for Ethan (Ethan Perlstein) from an Open Science Enthusiast to an Open Scientist. What can we do to further encourage upcoming younger researchers to be open scientists? That's the revolution!"*

Ethan replied, *"For sure. I mean to me, the first step was simply getting on Twitter and realizing there's a community of solidarity out there 'cause otherwise, you're just stewing in your own thoughts. So that's my definition of the first step. And then from there, people are going to have more specific interests and you'll find a sub group within the larger community that you can then complement the social network activity with real face to face activity and then you can start to do important things. The only thing I can say is that you need to first find that community of solidarity and Twitter is the easiest way to find them."*

How can younger students commit to open research practices without the fear of career or scooping risk hanging over them?

In reverse order, the issue of scooping. My advice would be to get your work/data/code out there on the internet as quickly as possible. This could be via an Open Notebook, on GitHub, or somewhere within the many platforms of Wikipedia etc. In terms of research papers, there are now many options to choose from in terms of uploading a preprint of your work. With regards to the fear of career risk, be bold! Take a 'wear open on your sleeve' attitude. I can highly recommend watching Erin McKeirnan's talk from OpenCon 2015. Also check out her project Why Open Research? Also from that event, I would suggest watching Michael Eisen's talk, Wear Open on Your Sleeve.

How have policies in the UK with regards to open science changed over the last few years? What do you think the most influential factors here have been? Do you think they are generally progressive policies?

This is a complex issue with so many players involved. When I first started to follow the UK's position with regards to open access many years ago, most of the key research funders had a reasonably strong position on 'encouraging' open access. (*The exception being Wellcome Trust who started mandating open access in 2005).* That wasn't largely effective (as elsewhere) which in part led to The Finch Group/Report around 2012. The outcome of Finch was a preference for Gold open access.

Since then, there have been influential factors by funders such as Wellcome Trust, the world's largest medical research charity funding research into human and animal health. Wellcome's progressive policies/position on open access can be found on various pages on their website such as here, here, and here. This year, they announced their own unique open access publishing venture, Wellcome Open Research which will start publishing research as early as next month.

I am also mindful of some salient responses from Jan Velterop when I interviewed him in 2012. *"What always surprises me in these discussions is their national focus, whereas science is one of the most global enterprises on earth. The most positive developments for OA have been the greater awareness of it, even in the general media. Little else is new. And even attention to open access by the Guardian isn't, as this article from February 2005 shows".*

What do you think the biggest impediments to open research are? How can we collectively combat or overcome them ?

First and foremost has to be Journal Impact Factor (JIF). This is despite an abundance of evidence which over the years has shown that this is a highly flawed metric. I would encourage academics to make enquiries within their Institutions to take a pledge and sign the San Francisco Declaration on Research Assessment, DORA. Secondly, as mentioned earlier, embrace the fact that it takes very little effort these days to get a preprint of your work archived on the web.

What tools or platforms would you recommend to researchers looking to get into open science?

There are so many these days, where does one start? The best resource out there at present (I am not alone in this view) is Innovations in Scholarly Communication (now available in

seven languages) created by Bianca Kramer and Jeroen Bosman. Also see https://innoscholcomm.silk.co/ which is super awesome.

Where do you see the future of scholarly communication? What steps are needed to get there? Whose responsibility do you think it is to lead this change?

I don't have the answers to those myself. As of the time of writing, I would highly recommend Open Science Framework. I am moving more and more in the direction of advocating preprints for any paper with optionally, publication in journals later.

RACHEL DUNLOP

Figure 45. Rachael Dunlop at QED 2013 in Manchester, UK. CC BY

RACHAEL DUNLOP ON THE CURRENT STATE OF SCHOLARLY COMMUNICATIONS

Hi Rachael! Thanks for joining us here. Could you start off by letting us know a little bit about your background?

I was a late starter in science, having worked in graphic design and advertising as my first career. I went to uni aged 26 to get a science degree and emerged 8 years later with a PhD in Cell Biology. I originally planned to become a Virologist but my Microbiology lecturer was so awful, I switched to Toxicology. Funnily enough, I'd never done any Biology in high school so in first year uni, I had to borrow my sister's year 12 text books to teach myself the basics of Biology – and now I'm a Biologist.

When did you first hear about open access and open science? What were your initial thoughts?

I can't really recall but it would have been around the time I first started publishing and became aware that if you paid an exorbitant fee, then people could read your papers for free. Of course, researchers never ever have a spare USD3000 to throw around on publishing so it just always seemed out of my reach. It's a great idea if you can afford it. As for open science, ideas are currency in research so there was never any discussion about participating in an open system.

What can research communities do to help address important issues such as gender imbalance in academia?

Sigh, so much. Some unis/institutions are actually taking this seriously, but it's such a slow process and sadly, I don't expect to see any real changes before my career draws to a close.

You've spent time as a research in both the US and Australia. How different is the research ecosystem between the two? Do they have different attitudes or practices to 'open science'?

Not that I'm aware of. Neither seem to be particularly interested in getting involved in it.

You work in the exciting field of brain chemistry! Do you find your research community quite open to sharing data and other resources?

No, not in the slightest. I think it will be a long time before this changes as long as current metrics for measuring career success remain in place. Basic science is very protective of ideas because intellectual property is currency.

How important do you think Open Access is in your field of neurodegeneration and ageing? Is it something that is developing fairly rapidly?

I'm not aware that it's developing at all. In a traditional field such as this, there are no compelling reasons to do it, as it's not obviously beneficial to individuals. When it comes to clinical trials, there are compelling reasons for data sharing, particularly negative results, and this is being spearheaded in the UK by Dr Ben Goldacre as part of AllTrials.net. I think it will be some time before it becomes a part of basic science.

Do you feel like it's easier to support open science if there's a human element to your research?

I personally do, particularly for diseases such as the one I study – ALS. There are currently no effective drugs so sharing information about therapies that might be showing efficacy – even if the effect is small – can mean the world to patients. On the other hand, we must be careful not to give false hope to people.

Have you found it fairly easy to commit to Open Access as a researcher? Or do you feel like your options are constrained?

No, because it's too expensive. If we had a spare USD3000 to throw around we'd be spending it on consumables. As for sharing data prior to publication, intellectual property is just too valuable.

Do you think there is more that researchers communities can do, and indeed should do, to communicate their research more broadly?

Yes, they should be taking time to communicate their work to the public, stakeholders and politicians. But until this is incorporated into metrics thus creating incentive to do it, I can't see it becoming the done thing. Which is a shame. Because we only have ourselves to blame when science gets distorted or misrepresented if we choose not to be part of the conversation.

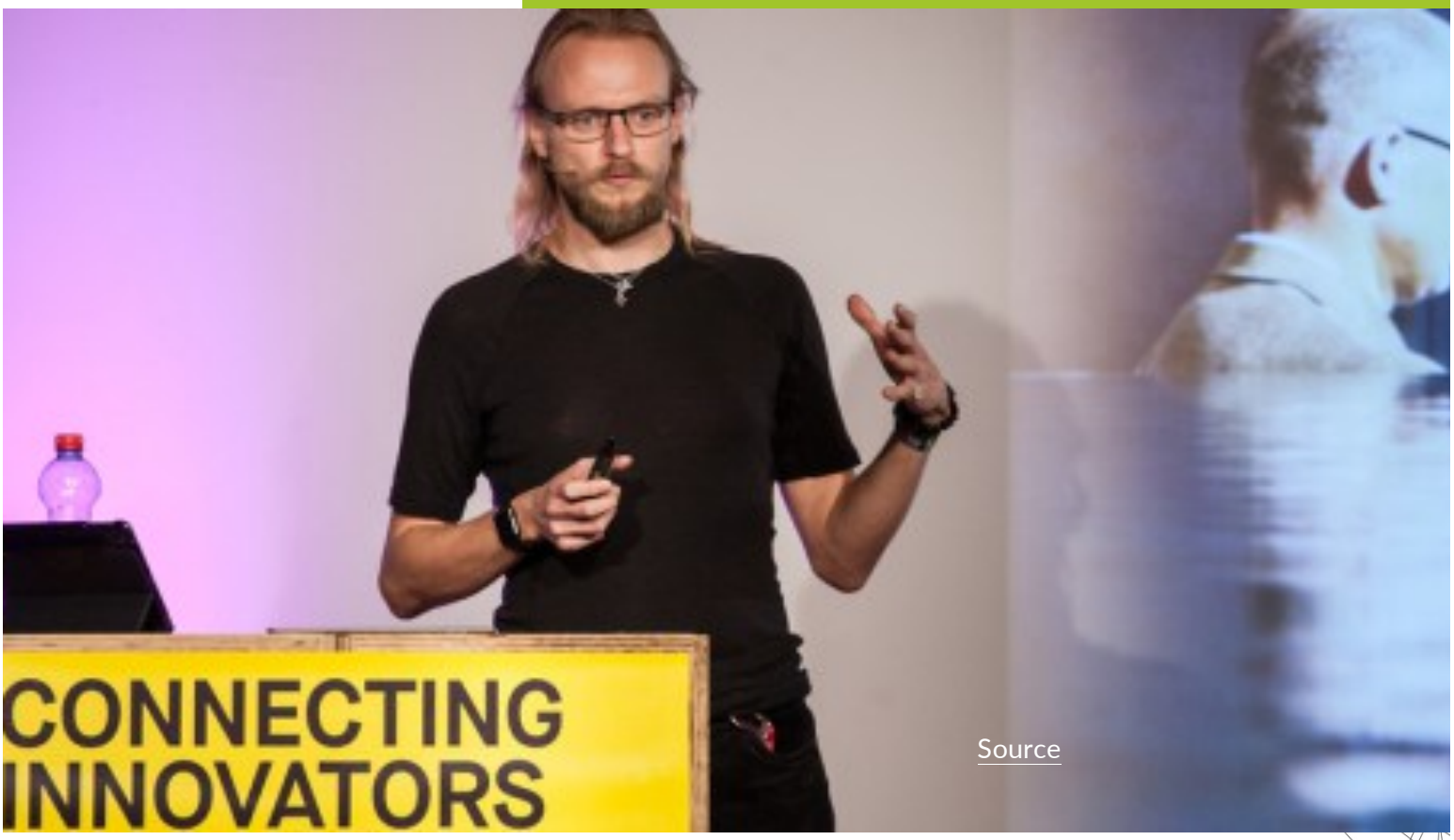
Where do you see the future of scholarly communication? What steps are needed to get there?

I think the academic publishing model needs to be torn down and re-built from scratch. Peer review is broken and journals are littered with predatory publishers. It used to be that if something was peer review published, you had some confidence in the quality of the work. This is not always the case anymore – it's become much more difficult to separate the wheat from the chaff.

Whose responsibility do you think it is to lead this change?

Us researchers from all fields not just in science. It's simply preposterous that we willingly hand over our work – some of which may have been funded by the taxpayer – to private corporations so that they may generate a profit from it. I mean, we literally raise the funds, do the experiments, write the manuscript, review colleagues' manuscripts ALL FOR FREE then sign away our copyright to someone who then sells our work for huge profits. So then both we and whoever funded the work have to pay to read it. It's so very broken.

BASTIAN GRESHAKE



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BASTIAN GRESHAKE – "AT LEAST NO ONE IS SERIOUSLY USING MATLAB.."

Hi Bastian, and thanks for joining us here! Could you start off by letting us know a little bit about your background?

Sure! Right now I'm working on my PhD in bioinformatics at the University of Frankfurt, the city in the middle of Germany that is famous for having a more or less working airport. Before I transferred into being an armchair/standing desk biologist I did a Master's degree in Ecology & Evolution. Much of my, maybe let's say "traditional", research is about how evolution has shaped the genomes of the funny living things around us. And then there's the whole open* shebang, which we'll probably talk about later.

When did you first hear about open access/data/science? What were your initial thoughts?

I'm not really sure whether it was before or during my undergrad studies. I was certainly experimenting with open source software since I was 15 or so. For the open access-part I at least vividly remember one of the computational biology nerds sporting an open access-shirt, so I guess that way of advertising works. In any case, in my naivety I was puzzled and shocked that open science and science aren't the same thing yet (c.f. this), as I would have assumed that academics would be progressive, being on the frontier of knowledge and all (boy, was I wrong!).

What is the state of 'open science' in the field of bioinformatics? Do you think it's progressing faster or more frustratingly slower than other fields?

Bioinformatics is a pretty huge field, so I don't really dare to speak for all of it. But at least for the part that I'm meddling in I think we're doing a pretty good job open science-wise. Much of the data people generate is ending up in open repositories, virtually everything is programmed in open source programming languages and much of the written code ends up being open sourced as well. And there are some decent open access journals, with pre-prints becoming more and more accepted as well. Of course, it's not perfect yet. Many people still seem to have a hard time to resist the siren song of Nature/Science publications and unfortunately it's also the case that people still use and publish closed source and commercial software for their analysis. But hey, at least no one is seriously using Matlab.

How has practising 'open science' sculpted your development as a junior researcher?

Having been dragged away from the pure wet lab biology into the mystic arts of bioinformatics I guess I was doing some level of open science right from the start of my active research career. So I'd say my open* evangelism hasn't been actively harmful so far, which I've heard is a risk, as much political activism is. But at least for the traditional academic pathways, it also hasn't been much of a direct boost as far as I can tell. Having said this, doing open* and being vocal about it definitely helped in finding and establishing international collaborations early on, largely thanks to social media (c.f. https://reddit.authorea.com/users/104315/articles/131285/_show_article)

What sort of obstacles have you faced so far as an open researcher, and how have you resolved them?

Openly sharing data has never been an issue so far, thanks to well-established rules for sharing, enforced by journals etc. And even without rules in place, sharing code never was one either. The biggest issue has been on the decisions on where to publish. As I mentioned earlier, people are still pretty much in love with the useless JIF, so that discussion comes up virtually every single time when it's time to submit/write up. Unfortunately all the lobbying in the world often isn't enough to convince all the co-authors to take the high road of open access.

How have you found other researchers and friends/colleagues to respond to your advocacy and practices? Are they generally accepting or resilient?

There are the people who fully support all the open* stuff, others are more resilient (c.f. publishing open access). And I think many people are smugly making a bit fun of all the weird activism and refuse to see the point (yes, that's you, who accidentally found the link on Facebook and are now smiling!).

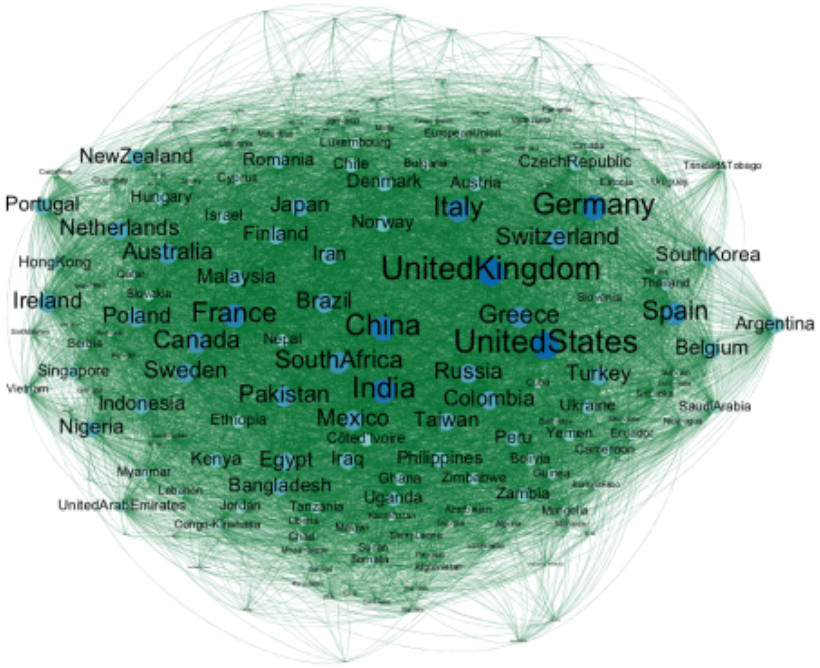


Figure 46. Bastian also runs the #ScienceIsGlobal campaign. Source

How have communities like OpenCon and FORCE11, which you're heavily engaged in, impacted upon the global development of open access, open data, and open education?

I think the biggest achievement of both FORCE11 and OpenCon is how they are building a diverse community by connecting young researchers from across the globe. Too often our open* work is still pretty much grounded in the things we know from our own experiences. Which, far too often, are based on our Europe/North American-centric view of the world. By bringing together very different communities we can learn so much from each other. And I

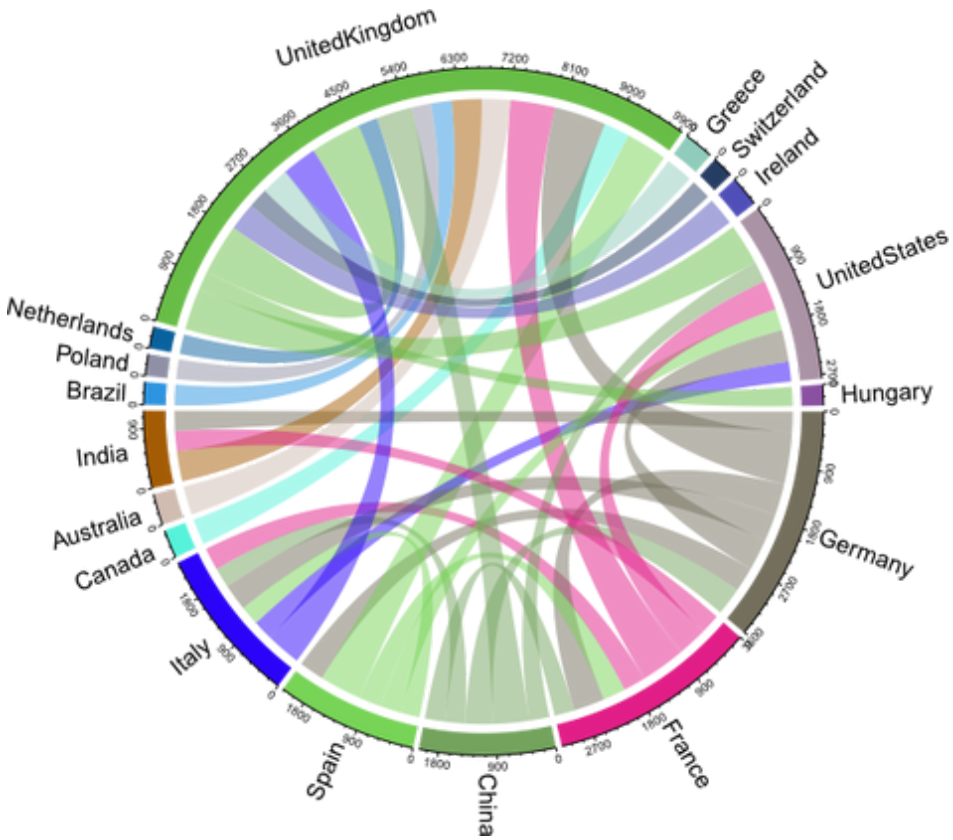
honestly think that we're in dire need of this kind of cross-pollination, if we want open* to succeed. As such it's great that we're having organisations like FORCE11 and OpenCon that foster the intersection of being open* while also trying hard to be committed to fostering global networks.

Rumour has it that you're the "The Mark Zuckerberg of Open Source Genetics" – what's the story here?

This comparison always makes me wince, even if I myself sometimes use that phrase for comic effect. That one goes back to an article that fusion ran on me, last year. After they did a profile on our work on openSNP, they also ran one on me as an individual. It was pretty hilarious. The reason for my wincing is that I don't see our work on crowdsourcing open data related to what Facebook is doing in any form or shape. We're completely non-profit and give away all of what we do, including all of these "intellectual property rights".

You co-founded the openSNP What's this for, and what was your motivation behind it?

The elevator-pitch is that openSNP enables everyone who's having access to their personal genome to donate it into the public domain, fostering the free and global re-use of human genetics data. With over 2.5 million people having done personal genomics testing that's a potentially huge data source, especially if people start annotating the data with their phenotypes (think hair/eye colour but also "did you have breast cancer"?)! And as data and source code are completely open there's no way our project can go all Google and turn evil, because everyone can spin off a clone. With now ~2800 data sets on openSNP we're managed to go around 0.1% of the way, it's baby steps. The main motivation for starting the project was rather personal: I wanted to donate my own data, to enable researchers everywhere to use it. Unfortunately, back then there was no good place to put my data to, so we got started with the project.



Source

How do you think 'open science' feeds into broader issues to do with 'open culture' or 'open society'?

I think all of these are pretty much interconnected, after all science is part of culture and society. That's why I always like to use the *open** notation, as most of the challenges of open science are also true for society, culture and whatever comes to your mind. Personally I feel that both science and culture (in a narrower sense of the term) have an obligation to challenge traditions, get us to reflect about our world and as such need to be positive role models. From my experience being open facilitates all these things.

What do you think the biggest impediments to open research are? How can we collectively combat or overcome them?

There's our own vanity, wanting to publish in Cell/Nature/Science, because of the fame and reputation we hope to get from it. This is also tied to the incentive structure we still face in many fields. Jobs, grants etc. are still being awarded for being successful, and this success is measured by exactly those vain standards. The first might be harder to change, but we can certainly tackle the incentive structure. We do see some change in rewarding openness, which goes into the right direction I think. Lastly there's fear. People fear that they might have made honest mistakes in their work and will be ostracized for them if found out. Not being open protects from this to some extent. If we want to foster openness we need to be more forgiving and accept that no one of is without fault.

What other or platforms would you recommend to researchers looking to get into open science?

Personally I find tools a bit boring to be honest. Yes, I've co-written one tool, and I use many of the open science tools. Git is great, open data repositories are great, tools x, y and z are great. But at the end of the data it's a change of mind-set, of culture, that's really important. Culture doesn't exist in a vacuum, but is driven by communities. So my recommendation is: Try to find others to do open science with. It's not only much more fun, it's also much easier to learn something new if you're part of a community. And last but not least: The bonds you will form and the lessons learned are – at the end of the day – much more lasting than the tools you will use.

It's hard to give specific advice which communities to look at, as that depends heavily on the topics you're interested in. In general the already mentioned ones, OpenCon & FORCE11, aren't too bad a start. And if you want to go into tools: Try to bond with projects that are close to your interests and see what's going on there. So you can have your cake and eat it too: nerd out about open tools and find a community.

If you could give one piece of advice to students looking to pursue a research career, what would it be?

Be wary of anyone telling you that research needs to be performed in a certain way, especially if the claim is that things have always been done that way. Much of the really interesting science does not (and can not) happen in the trodden ways.

PROF. KAMEL BELHAMEL

Fig. 47. Image credit: Kamel Belhamel

PROF. KAMEL BELHAMEL: "FOR THE GLOBAL SOUTH, OPEN ACCESS IS AN OPPORTUNITY IN TERMS OF INNOVATION, THE DIFFUSION OF KNOWLEDGE AND THE EMERGENCE OF NEW IDEAS."

Hi Kamel, and thanks for joining us here! Could you start off by letting us know a little bit about your background?

Thank you for interviewing me Jon and congratulations on receiving your hard-earned doctoral degree. Best wishes for the future. (*Ed: Thank you!!*)

am Kamel Belhamel, full Professor of Chemistry at the University of Bejaia, director of the Laboratory of Organic Materials and Editor in chief of Algerian Journal of Natural Products (E-ISSN: 2353-0391). I graduated in Chemistry at the University of Setif- Algeria and achieved my PhD at the same University in the field of Process Engineering and Chemistry of Materials. I have taken part to several international projects such as: Italian project, German – DAAD, French- Algerian framework programme CMEP and co-ordinator of several Algerian national research projects, CNEPRU, PNR). My scientific activity is focused on the chemistry of macrocycles; Solvent extraction of metal ions from ores and waste solutions; Extraction and study of chemical composition from plant extract; Electrodeposition of metals and alloys. I am author/co-author of 20 scientific papers in international scientific journals and more than 50 abstract books in national and international conferences. I was Supervisor of many Master's and 11 PhD students. I am a member of the Scientific Committee of the Faculty of Technology, the Algerian Chemical Society, and Training Manager of Master of Science: pharmaceutical processes at the University of Bejaia. Recently, I was appointed as the DOAJ Ambassador for North Africa.

When did you first hear about open access/data/science? What were your initial thoughts?

I have heard about open access journals during my first scientific visit to Freie Universität, Berlin in 2000. When I selected an open access journal, *Molecules*, and edited by MDPI, in order to publish our research results, my friend, Prof. Rainer Ludwig, has refused to publish in this journal because, in this period it hadn't obtained an impact factor and asked for high APCs (article-processing charges). One important element to keep in mind when discussing Open science, that this concept is very old. By the 12th century, Bejaia, my city was an important port and an open centre of science in the North Africa. The Italian mathematician Fibonacci (c. 1170 – c. 1250) has studied Arabic numerals and algebraic notation in Bejaia. He introduced these and modern mathematics into medieval Europe in his famous book *Liber Abaci*. Another influential North African Muslim thinker of the 14th century, Ibn Khaldun, has been extensively studied in the Western world with special interest. He has written a part of his famous *Muqaddimah* "Introduction" in Bejaia. This document, summarize his theories of the science of sociology, was the greatest legacy that he freely offered for all of humanity and the generations to come.

The bust of Ibn Khaldun and the entrance door of the Casbah of Bejaia (built in 1154, place of learning for Ibn Khaldun , Fibonacci and other scientists). Image credit: Kamel Belhamel

You recently were appointed as the DOAJ Ambassador for North Africa – congratulations! What sort of activities does this role entail?

Really, I am very proud to join DOAJ team. It's exciting and motivating to be a part of this not-for-profit organisation. DOAJ gives me the opportunity to work in a pleasant multicultural environment and to meet very nice friends from different parts of the world. Every member of the team collaborates and this synergy carries us further and faster than I could have imagined. DOAJ now operates from 15 different countries. One of my roles is to help editors and publishers from Northern African countries to increase the visibility of their journals and to facilitate the improvement of scholarly publishing. Many of those editors don't have the experience of ensuring the quality and the transparency of the editorial process. As I am Associate Editor of DOAJ, I assist the group Editor with the processing of journal applications received from my region. Other activity is participating in seminars and conferences in order to promote the principles of transparency and best practice for scholarly publications.

We've heard from another couple of our Open Science Stars about the state of scholarly communication in North Africa. What has your experience been like in Algeria?

I have seen the blog post of my colleague Samir Hachani and I agree with him on many points. As many North African universities don't have a strategic approach to scholarly communication, most of research production is growing slowly and relatively invisible. Nearly all Algerian researchers preferred to publish their papers in European journals with an impact factor, in order to achieve certain personal goals (e.g. better career opportunities and advancement, CV fortification, etc.). One other factor is that many editors of open access journals don't have the experience of ensuring the quality of scholarly communication and

the transparency of the editorial process. Due to poor connection quality, the Internet in Algeria requires new policies and strategies to be implemented in order to make the online situation more suitable for Internet end- users. The purpose of this strategy is to connect the majority of the cities in Algeria by using optical fibre to provide students and researchers with high-quality services. This technology will certainly contributed to increase the output and quality of academic journals and other forms of scholarly communication produced in Algeria through new models of communication such as blogs, wikis, social networking and RSS feeds. The Knowledge can't be treated as a commodity and its dissemination is more than ever a vital concern in the Northern African countries.

What is the state of open access like at your institute? Is there a national policy for OA?

The Communications Technologies are transforming gradually Algerian Universities, especially at the University of Bejaia. The initiative aimed at increasing the visibility of researchers and student through harnessing the potential for scholarly communication in the digital age. The website of the University Bejaia seeks to share useful innovations, both in thought and in practice, with the aim of encouraging scholarly exchange and the subsequent benefits. We can find information about open access journals edited by Faculties, webTV of all recorded thesis and conferences, E-learning and personal website of all Staff of the University as well as a repository of published papers, books, book chapters and more.

How well informed are researchers about issues like open access, impact factor mis-use, and data sharing, in your experience? What can we all do to help improve the level of 'open education'?

As I have already said in my blog post published in DOAJ website about Open Access Journals Strategy in Algeria, the Algerian researchers preferred to publish their papers in European journals with an impact factor. They have the access to those journals via their universities and think that access is free, when in reality it is not. The universities have often been involved in lengthy negotiations around the price of their site license and reuse of this content is limited. In order to limit the budget for the access to scientific journals, now there is only one portal for all Algerian Universities, this portal named 'The National System of Online Documentation' (SNDL) provides access to national and international electronic documentation, covering all areas of education and scientific research. As part of the outreach to interested Algerian researchers in open access, the Ministry of Higher Education and Scientific Research has already decided that PhD students can defend their thesis by publishing their papers in Algerian open access journals indexed in Scopus, Web of Science, DOAJ, etc. One of the most important OA journal promoters in Algeria at this time is DGRSDT (National Council of Scientific Research and Technology of Algeria). Since 2015, the DGRSDT has organised workshops and supports Algerian editors in the implementation of open science.

You're also the founder and the Editor in Chief of the Algerian Journal of Natural Products, which is fully open access and charges no publication fees. Why did you establish this journal? How has this been received by the research community?

Many Open Access journals are labours of love produce by academics themselves. I think in this life we have a mission, the challenge is to seize the moment and utilize every opportunity we have to do more good. As I am a great believer and supporter of Open Access, I spent a lot of my free time to design the general layout and processes involved in publishing of my journal. As it is known, new journals are always with less reputation and don't have an impact factor, however, the young researchers are well-advised to strive for publications in journals with high impact factors, and that is a big deal! I think that the decision about where to publish should be based on whether the journal is read and respected by your current and prospective colleagues, not on the impact factor. There are many journals with very low impact factors and very high reputation because they are quite difficult or/and their scientific field is of interest to a narrower audience.

Was it easy to set up this journal, technically and financially? Would you encourage other researchers in North Africa to consider doing the same?

I have launched this journal since 2014 on a voluntary basis. It was not easy at the beginning; however, in order to improve the quality and reach of scholarly publishing of my journal, I use Open Journals Systems (OJS). This publishing software has significantly enhanced the productivity and ease of use of my journal. In Algeria, if a journal involves fees (APCs), it will be considered as predatory, so this is why all Algerian journals are free of charges and do not charge an APC. Financially, they do not receive direct funding, but they are hosted for free on the websites of their universities. Out of **359** Algerian scientific journals listed by the DGRSDT, my journal is only one of 7 journals which are indexed in the DOAJ. Recently, ScienceOpen has launched a new competition for 'platinum open access' journals. My journal was selected to be included in the platform of ScienceOpen. I really encourage other researchers in North Africa to consider doing the same.

How are communities such as OA Algeria helping to catalyse open access developments in Algeria?

For the global south, open access is an opportunity in terms of innovation, the diffusion of knowledge and the emergence of new ideas. "Open access is good for researchers, good for innovation". Many researchers work on the subject, but almost separately, with weak communication between groups. Our mission in OA Algeria seeks to achieve a) promotion of the exchange of ideas and experience among Algerian editors and researchers, b) Work closely with the researchers from Algerian universities to support the use of open-source platforms that can interface with outputs such as articles, journals and books. This collaboration with OA Algeria will foster more research and data sharing, with the aim of establishing global collaborative efforts by co-operating with international researchers and editors and organizations in the advancement of open access.

How can platforms like ScienceOpen help younger researchers develop their skills in open research?

Usually young researchers are confronted with the problem that their scientific quality will be judged based on the impact factors of their publications. However, a paper published in journal with high impact factor and many citations takes long time, more than year. As

ScienceOpen considered as 'Research and Publishing Network', younger researchers can publish more rapidly and their publications will be immediately available for Public Post-Publication Peer Review. This new concept for scientific evaluation can help in changing the old scholarly communication system. The researcher will be evaluated only on his scientific results not on the impact factor of the journal where his results were published.

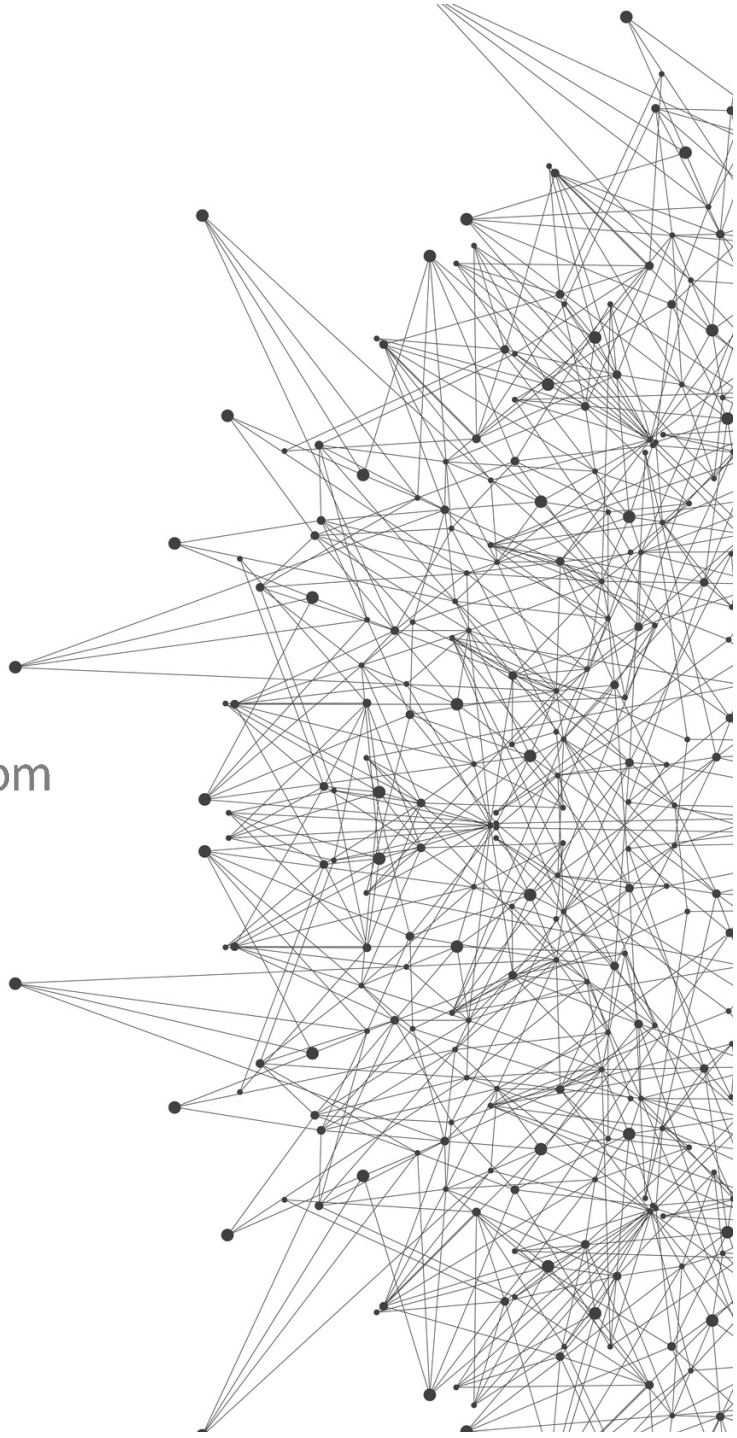
What other tools or platforms would you recommend to researchers looking to get into open science?

Twitter, Linkedin and ResearchGate are the most social networking sites for scientists and researchers to share papers, ask and answer questions, and find collaborators. However, I find the RG Score published by ResearchGate has questionable reliability and don't reflect the citation impact of researcher because the measurement based on unknown calculation method. The citations measure the activity not the quality of the published papers.

If you could give one piece of advice to students looking to pursue a research career, what would it be?

Be patient and be sure about what you want, have projects and manuscripts at all stages of the process of publishing, look what journals are suitable for your research, what kind of research is needed, who their editors are, expose **yourself to the world, and let others know your work and publications**. At the end, be careful, some journals accept to publish anything for money.

All personal opinions provided herein are of those as individuals and do not represent those of any interviewee's employer, colleagues or professional networks.



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