Legacy of Jon Tennant, “Open science is just good science”

Jon Tennant, Open Science Pioneer

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Abstract

This work is a transcribed and edited collection of the message delivered by Jon Tennant in his talk “Open science is just good science”, May 21st, 2018. In readable form with many links, this paper provides a primer on open science and the open science movement. It details the problems with closed access science as it is still practiced today, and how big publishing as an industry is largely responsible. It talks about the ethics behind open science practices. It provides many statistics and links to information about paywalls, movements such as Project DEAL, workflows, and personal and community issues such as fear and cultural inertia that may prevent us from adopting better science practices.

Forward

This is a ‘paper’ version of a blogpost by Nate Breznau ([2022](#)) of the same title. The advantages of publishing this as a ‘preprint’ are that the scholarly community is more likely to find it than the original. Moreover, as the writing is an edited and abridged transcription of the talk ‘Open science is just good science’ given by Jon Tennant in 2018 at the annual meeting of DARIAH (“Digital Research Infrastructure for the Arts and Humanities”) a European Union based network to support digitally-enabled humanities research and teaching, it is possible to add Jon as an author so that he gets credit for the impetus and ideas framing this work. His talk took place on the eve of major events in the Open Science Movement to which Jon contributed an enormous amount in a short period of time. The talk, presented here in readable format and appended with links, additional info and citations, provides an excellent primer on open science. This post is offered in honor of his memory as Jon passed away April 9th, 2020 in a motorbike accident. Any changes to the original wording of his speech are intended to focus, clarify and better communicate his message – a candid voice for open science.

Jon Tennant at DARIAH, 2018

Jon Tennant = open science

My story began about seven years ago... I was a master student in London at the time at Imperial College and I was talking to a friend and I was saying 'you know I'd really like to publish my master's thesis'. And he said 'well, you know, just make sure that it's open access'. I was like 'what the hell is open access?', and he said 'it's where you make your research freely available to everyone.' And I thought 'well doesn't everyone have access to... oh wait...', and I had **everything sort of like "unraveled" about my academic history up to that point.**

When I was a student I would hit paywalls all the time, and it just seemed like a common everyday thing. Like, 'oh crap this one's paywalled, guess I can't use that, move on to my next one'. I realized that despite being in a ridiculously privileged position at a very elite institute in the UK, I still couldn't actually access the things I needed to do my own research. The more I thought about it, the worse it became.

So what are the things that motivate me in the morning?

WHAT GETS ME OUT OF BED IN THE MORNING

- The vast majority of scholarly research and knowledge is held hostage by private enterprises
- This disadvantages everyone on the planet, except for those in the wealthiest, elite research institutions
- These commercial giants are ruthless racketeers that have profit margins that exceed Apple and even 'big oil' (> 35%)
- We are not communicating research effectively, and our world is suffering as a result

A recreation of Jon's slide from the video and [this blog post](#) (Schmitt 2015).

These are the big picture things that the open science movement is trying to solve, like the fact that the vast majority of scholarly research is still held hostage by private corporations. Around 75% of all published knowledge which should be available to humanity, is instead owned by shareholders or private companies (Dodds 2018). This disadvantages almost everyone on this planet except for those who are fortunate enough to be in a privileged position at an elite institute. These commercial giants are ruthless racketeers. They have profit margins often in excess of 35 to 40 percent, which is even bigger than Apple and all the big oil companies. The result is that as a global research community, or scholarly community, we are not communicating our results effectively, and then so many massive issues that are affecting our planet are suffering.

There are major barriers to the dissemination of scholarly knowledge. Copyright is a huge one. It is completely and utterly broken. It does not protect us as content producers; it protects the profits of scholarly publishers. Often we can't even access our own research results and we are prohibited from sharing them due to anachronistic copyright laws. As consumers, often we don't even know what we're buying until after we've bought it. You can pay 40 bucks to access a research article and you have no idea what's actually in it or if it will prove useful, and there's no way in hell Elsevier is going to give you a refund for that. We have life-saving research; but most cancer and global health research is still hidden behind paywalls. And the

real question is: how is any of this helping science or research, or having an impact on the global challenges that we are facing?

Consider the bigger picture, for example the sustainable development goals set by the World Health Organization includes things like economic growth, industry innovation infrastructure, reduced inequality, clean energy, and combating energy insecurity, water insecurity, and hunger. **If you believe that research can help us achieve these goals and resolve these issues, then you must also acknowledge the corollary that preventing access to research stops us from achieving these goals.** This is exactly the system which you're playing in: you have an industry that thrives on preventing access to knowledge that's how it makes its money. It's not a bug. That's a feature. It really is systemic and it's parasitic as well if you want to use an ecology term.

One of the consequences of this is that public trust in research and expertise has plummeted over the last few years (Jewett 2020) [1]. We see expertise effectively dismissed especially from scholarly experts as if what we're doing is no different than just Googling something. I've created a hypothetical conversation here, but this sort of conversation happens even at the highest levels. Like in Congress when researchers go to present evidence, they get rejected because politicians are like 'you know, isn't that research published in *Science* or *Nature* just 'fake' basically?'.

From Jon's Slideshow

Academic: "This research paper has been published and therefore is scientifically valid."

Non-academic: "But it's paywalled. I can't access it. How do I know it's valid?"

Academic: "Because it has been peer reviewed."

Non-academic: "Can you show me the peer reviews?"

Academic: "No. But it was done by two experts in the field."

Non-academic: "Which experts?"

Academic: "We don't know. But it's in a top journal."

Non-academic: "Why is it in a top journal?"

Academic: "Because it has a high impact factor, so is highly cited."

Non-academic: "Why does that make the research better?"

Academic: "Trust me. I'm a scientist."

If you think about it, there's not really much reason why politicians and the public shouldn't think that (Breznau 2021). Trust has to be earned, and trust is something that opacity does not breed. **In a world where transparency breeds trust we shouldn't actually be surprised when expertise is rejected because we're operating within a closed system.** If we step outside of that system and look at it, or empathize with those who are outside it, then actually it makes sense why we have a sort of chaotic relationship with members of the wider public at the moment. The ivory towers of academia are certainly crumbling due to the wider open movement, but is it happening fast enough and what are the consequences when it doesn't move fast enough?

What is open science?

There is actually no universally accepted definition of this. Open science is about using science to help address the major challenges to society. Ironically if you look at the one systematic review of what open science is (published and paywalled by Elsevier) it says that 'open science is transparent and accessible knowledge that is shared and developed through collaborative networks' (Vicente-Saez and Martinez-Fuentes 2018). So does that mean that open science excludes anything done by the individual? It's a pretty stupid definition if you ask me. But you can't read it anyway because its paywalled. So, when people use 'open science', often people will think oh they just mean you know 'physics, biology, chemistry', but when I talk about open science I mean in the most inclusive sense possible. 'Open science' is often used interchangeably with open scholarship or open research, but we just have to make sure that we include everyone; so it includes humanists, social scientists, even artists, engineers, mathematicians, medics, and citizen scientists even are included under this umbrella of what open science encapsulates.

For me, open science is based on core principles. I've got this table from [Tony Ross-Hellauer](#).

Source (Ross-Hellauer 2017)

This above is a combination of practical aspects and personal aspects behind open science. For example, accessibility, equality, and rigor are practical aspects; but there also are ones you might miss like freedom, fairness, justice and truth. For me, these are principles that you should adopt anyway as a good human being; and if so, then you're basically an open scientist, or open scholar. You can embed these practices within your everyday life, or least practices you should be doing as a researcher. But in the practical aspect, open science is bloody complicated. I don't want to hold that fact back.

You can make your workflow more open by ...

This is the rainbow of open scholarship tools (Kramer and Bosman 2018)

Open science includes things like discovery, analysis, writing and publication, all the way through to different tools used for assessment and evaluation. There are entire workflows here which we need to be trained at, but no one's really teaching us how to use them. Imagine we are all aware of at least one of the above tools or practices, but integrating all of these into your everyday workflow as a researcher can be quite complicated. Another really important question I think we need to ask is:

How is open science objectively different to science?

Mick Watson, in 2015, just wrote this beautiful article 'When will open science simply become science?' (Watson 2015). Those principles and tools above are just good science. Mick said 'open science describes the practice of carrying out scientific research in a completely transparent manner (good science) and making results of that research available to everyone. Isn't that just science?' And it's difficult to disagree really. **So when we talk about what open science is, it really is just better science; and the opposite of open science is just bad science, because if you're not sharing in a transparent manner, then you're basically creating anecdotes rather than research.**

Is open science a movement?

A lot of people describe open science as a movement. A movement is defined as a group of people working together to advance their shared political, social, or artistic ideas. The implication of this is that a movement has a direction with shared common goals based on commonality. So if open science is a movement (Engzell and Rohrer 2020), then who is defining the direction? Who is defining the shared goals? What's the strategy behind it? Who's leading it? Is it DARIAH? Is it the Open Science Framework? What happens to those who don't feel included in that movement? A nice example of this is one time when I had to go to the Humboldt Institute with some open science colleagues as part of an outreach workshop to teach them different methods of doing open science. When we went there, they actually ended up schooling us in doing something way better than what we were doing using virtual machine environments. And we were like 'oh cool so you've basically already done open science anyway!' and they were like, 'yeah but we just don't call it that.'

Is open science a process? A set of principles? A vision, a club, a political agenda, fad, a distraction, is it exclusive?

What happens when we, as a supposed movement or community, actually can't answer any of these questions? I think that's kind of important because it gets to the root of what open science is and how it is objectively different to what we as a scientific community are doing. Then that can help us define a strategic direction for the future of what we actually want to achieve, once we fall back upon that.

Among academics, there is this mantra publish-or-perish. **But there is no publish-or-perish anymore. It's publish-and-perish.** You can publish a lot during grad school and still be told that you're not qualified enough to get a postdoc. There's too much competitiveness, too much is driven by funding, and too many people coming in through the pipeline being drilled into this sort of narrow ivory tower mindset of how to do academia as soon as we start. One of the first things I was told when I became a PhD student is within like your first year or so you better publish a high-impact paper. I was like 'dude I don't even have any data yet'. I did publish eventually, but it was a lot of strain and it's a lot of stress to deal with that at Imperial College. Out of the 50 or so PhD students that were part of my cohort, pretty much every single one of them left with insomnia, alcoholism, depression, anxiety, or stress because they were treated like farm animals because of this publish-or-perish mentality. And we wonder why PhD students have almost twice the amount of mental health problems as people who work in emergency health services. We don't have any sort of support framework.

These giant mega-publishers are partly to blame (Yarkoni 2016). We've heard of Springer and Elsevier et al. mentioned before. There's a great quote from the journalist George Monbiot. He said that "academic publishers make Rupert Murdoch look like a socialist" (Monbiot 2011). I think that's a very 'positive' outlook. It's also known as the industry the 'internet could not kill' (Cookson 2015). Back in 1995 Forbes wrote a really great editorial saying that Elsevier would be the Internet's first victim (Dolan 1998). Elsevier went on then to basically have unbounded profit increases. It is still ongoing. It's a twenty-five-billion-dollar-a-year industry in 2018. It's extremely fat and bloated and 35% profit margins are fairly typical. We still talk about "papers", I mean its 2018, and we're still referring to "papers", and **what we have at the moment for the vast majority of our scholarly communication process is a 19th Century process of peer review applied to a 17th Century communication format** around journals and articles. We still mostly use PDFs as well. I think it's probably about time we adapted to the web of 1995 for scholarly communication because we're seriously lagging and it's a very strange system to be part of right now.

I'm sure we've all heard of Sci-Hub and ResearchGate as well. These are essentially platforms that want to provide increased access to scholarly research but are viewed as 'pirate sites', as if liberation of knowledge is equivalent to plundering and murdering. The American Chemical Society and Elsevier and their kin are suing them for millions of dollars and shutting them down preventing access to this research. **For some reason sharing research is illegal**; have a think about that one. The more you know the worse it gets. Only 25% of all scholarly research articles are open access and that comes about 20 years after the Budapest Open Access Initiative. We're increasing our rate of free access to knowledge about 1% every year, so maybe in about 30 or 40 years we'll finally have substantial access to research knowledge (see OS Timeline Updates at the end of this paper for more info).

We have this prestige-based economy where your worth as a researcher is based on the commercial brands dictated by corporate values which you elect to publish in for whatever reason. There are various biases in this, for example if you are a minority researcher, woman or early career researcher then you are incredibly biased against from the outset (Dion, Sumner, and Mitchell 2018; Lerback and Hanson 2017; Pownall et al. 2020; West et al. 2013)[2]. As we all know, researchers write, review, and edit the papers; so they generate around 95% of the real value behind scholarly communication. Then we (the researchers) have that content stolen away from us by publishers and then sold back to us. When you wonder how they generate 40% profit margins, **it's like going into a restaurant and bringing all of your own ingredients cooking the meal yourself and then being charged 40 bucks for a waiter to bring it out to you on a plate.**

Its bullshit. The old saying is, ‘it’s smart people doing stupid things for smart reasons’ and the reason is because our careers depend upon this publish-or-perish mentality. But at the end of the day we’re basically being duped as a global research community. We are no longer researchers. We are the oil for the machine. The provider, the product, and the consumer for this mega corporate entity out there. The market itself is an incredibly dysfunctional part of a wider oligopoly, similar to a monopoly. Yeah, we have lifesaving research about cancer, Ebola and Zika for example. All hidden behind paywalls – sold off to the highest bidder at the will of Elsevier’s stakeholders. The Ebola outbreak was, what, four years ago? Just two days ago, *Nature* finally decided to announce they would provide open access, for a limited period only, to Ebola research. So a round of applause to Springer Nature for acting four years after they were supposed to.

If anybody’s not angry at scholarly publishers yet, then I’m clearly failing because you should be.

In Germany, you have a national library consortium who are currently revolting against the revolting practices of Elsevier and their kin. At a publishing conference I attended earlier this year in Berlin [[APE 2018](#)], [Martin Grötschel](#) was a speaker. He was in 2018 the president of the [Berlin-Brandenburg Academy of Sciences](#), and typically at these conferences he is supposed to get up and give a nice speech about what a great job everyone’s doing and give them a little round of applause for being who they are. But this was a conference held by Elsevier and Springer Nature and instead, he followed the vice president of External Relations of Elsevier onto the stage, and he spent about 15 minutes slamming the crap out of them in the most beautifully German way possible. He is one of the chief negotiators behind [Project Deal](#). He is actually in the room when negotiating these big deal subscription contracts with Elsevier et al., and he was saying that he feels like he’s being bullied half the time.

He said during one of these negotiations, “we don’t want to pay Elsevier anymore because we don’t see the value in what you’re doing” and he described what followed:

“One publisher [Elsevier] stated ‘if your country stopped subscribing to our journals science in your country will be set back significantly’. I responded, ‘it is interesting to hear such a threat from a producer of envelopes who does not have any idea of the contents’”

-[Martin Grötschel](#), at [APE 2018](#)

Pretty harsh. Hilarious at the same time. But whichever side you are on, however you look at this, there are these enormous rifts happening in the world of scholarly communication at this moment. It's basically big publishers versus everyone else. They are entering the legal realm. They influence copyright, career advancement, the structure of our research institutes, and there are really deep issues happening here. In response there is an open science revolution infiltrating into many of these aspects. Project DEAL is causing quite a mess for big publishing.

In France recently, we had a similar thing between the Couperin Consortium and Springer Nature. Couperin served up the middle finger on a silver platter and said 'we're not going to subscribe anymore'. They saved 12 million euros every year in subscriptions which they are reinvesting into open scholarly infrastructure. Sweden announced two or three days ago that they, the Bibsam Consortium, are doing the same thing. They cancelled all subscriptions to Elsevier journals and they're like 'crap, we've got like all of this money we've been wasting on journals for these last 30 years now what do we do with it?!' It's fantastic and if you look in Taiwan, South Korea, Argentina, and Mexico they are all gearing up to do the same thing (Normile 2018; Schiermeier and Mega 2017). Oddly it is just the UK who seems to be not too fond of this.

We have so many awesome web-based technologies to open scholarly communication

Why on earth are we still communicating in PDF articles with thumbnail sized images when we have an entire web at our fingertips? I assume we all know about tools like GitHub, StackExchange and Wikipedia. Why not use something like the moderation or editing system of Wikipedia combined with the reward structure behind StackExchange combined with the version control of GitHub in order to create a fully integrated, community owned, very cheap, open scholarly communication system? And before anybody says 'it can't be done', people are doing this already! I'm not sure if they are in digital humanities, but you know there are communities like computer scientists who are doing these sorts of things already, which brings me on to penguins.

What do Penguins, Cobras and Gimli have to do with open science?

Cultural inertia defines academia. It's a crowd based physiological effect and pervades all aspects of the Academy. Have you ever met the average academic? 50% of academics are stupider than the 'average academic'. They have this publish-or-perish mentality and they are generally terrified of new technologies. It took me about a year just to even set up a GitHub profile. We are also really bad at making predictions, like 10 years ago, people said 'open access is never gonna happen', eight years ago people said 'open data is never going to

happen', three or four years ago people said 'open peer review is never gonna happen'. Now people are saying preprints are never gonna happen. Yeah... all of these aspects of open science are happening in some sort of way in one form or another already, and it's fantastic. **But in doing so we've created a whole range of new technical social and language barriers around these new developments and that's a bit of a problem.**

We like to think that openness is supposed to be inclusive right? It is one of the key founding principles of the open science movement but is that actually the reality? Have we created a new system that's open for some and not open for all (Chan et al. 2020)? I would argue yes, and **one of the reasons for this is that there are immense barriers to change within academia**. We have a suite of social, cultural, technological, political, organizational things that create vast barriers, to each of us on an individual or community level, to actually progress in a way in which we think is most beneficial to our communities (Dutta et al. 2021).

Reproduction of Jon's slide from video

Three of the biggest stifling effects are **fear**, particularly for the most underprivileged, **competition**, because we all want to advance our careers, and the abuse of **power** dynamics from those at the top. All of this create **inertia**, which prohibits course correction. If you look at the values that are driving open science: things like how to reduce publication bias, how to increase access to knowledge, how to make research more efficient and reliable, how to make it more sustainable, and how to foster collaboration: almost every one of the barriers to these revolves around fear. For example, fearing of being scooped, or

fear of information overload, fear of wasting time learning new practices or fear of poor research quality. Fear of errors and public humiliation is a big one for grad students. It's this concept of fear, and this is where the Penguins come in. Researchers are like penguins.

Tenor GIF, as presented in Jon's slide

Penguins spend most of their day huddled up together on an ice cap. Eventually they all start to get a little bit hungry, and they look longingly at the water. Food is out there, but so are killer whales. And no one wants to be the first one to jump into the water because they're afraid of being eaten. Eventually one of them gets so hungry that he slides down off of the the iceberg into the water, and goes hunting for fish and he's very happy. Then all of the others are like 'oh, well he was safe, so maybe we can go down too', and eventually one-by-one they all start laying down and they go off. And no one gets eaten, well sometimes someone gets eaten but that's life, but it's the same as academics.

There are new technologies and new processes and everyone's terrified of being the first one to jump in. This fear is coupled with the fact that we're almost singularly only rewarded for gaining academic capital based on the journals that we've published in. So we have an academic industry that relies on creating this 'stifling effect' over innovation and progression of a field. We are generating a lot of value for the publishing industry but we're losing out as a global research community in the process. People talk about providing incentives to do open science or 'sticks and carrots' to make people do better science; but it's kind of missing the point that **we should actually be doing good science in the first place. We should not need to be incentivized to be transparent about our work, that's the completely wrong way of looking at things in my view.** That's why the penguin analogy sort of works.

The next analogy is cobras. The cobra analogy is about key performance indicators and how having a performance-based evaluation system revolving typically around publication is damaging to academia and to global scholarly research. I call this the ‘cobra effect’, i.e., perverse incentive. There’s this really well-known anecdote about when the British ‘occupied’ India. Administrative officials were concerned that there were too many cobras in Delhi. So they created a new policy that members of the populace would be given money in exchange for any dead cobras. In return, the locals started breeding thousands and thousands of cobras, and then got a lot of money for them. So a policy designed to cull the number of cobras perversely led to a population boom in the end.

And the same thing happens in science if you look at how we are rewarded based on citations and impact factors. That’s what we what we end up aiming for. There’s another great paywalled article which came out last year that looked at this effect in Italian researchers. What it found was that within four years after the Italian Research Council’s policy saying that citation metrics were going to be used in hiring practices, it led to as much as a 179% increase in the number of self-citations. So it was a great idea executed in the wrong way, and led to an unintended consequence. It’s called Goodhart’s Law. When a measure becomes a target it ceases to be a good measure.

“When a measure becomes a target, it ceases to be a good measure.”

-Goodhart’s Law; quoted in Jon Tennant’s slide

When high impact journals are the target for researchers they shift their priorities from scientific method to ‘how do we get into high impact journals?’. They conclude, ‘oh we have to tell a really good story, we have to get better data for our work.’ And that skews the research process, because **the research process should never be about aiming for a high-impact publication. It should be about discovery of truth. Right?** (Tennant and Wien 2020). But we’ve skewed that.

So this is the game; and people always respond saying ‘well you know this is just a system that we’re a part of.’ But the system comprises of people, right? So anybody who is complicit in citation gaming, should be accountable for those actions. The fact that we are rewarded for high-impact journals is backwards. If you look at peer reviewed publications in the top journals its of typically a lower quality. The research has the highest probability of being retracted not due to more eyes but due to the probability that researchers have committed fraud or tried to cut corners in order to get into those journals[3].

Figure from Fang and Casadevall (2011), similar to [Jon's slide](#)

According to this figure, 'top journals' mean worse research. It also demonstrates that the impact factor has perhaps nothing to do with the quality of research itself (Brembs 2018). The inverse of what we expect. One thing I tell researchers is 'if you use the impact factor to evaluate the quality of another person's research or of an individual researcher, then all of your papers that use any form of statistics should be retracted; because you sure as hell don't know a thing about statistics'.

"If you use the impact factor to evaluate the quality of another person's research or of an individual researcher, then all of your papers that use any form of statistics should be retracted; because you sure as hell don't know a thing about statistics"

-Jon Tennant, '[Open science is just good science](#)'

That's a powerful message to tell people especially in senior positions.

How does open science factor into this? Some possible ways forward.

One solution is to use altmetrics and article-level metrics so that we don't just use one crap proxy to evaluate an incredibly complex system of research. If you haven't signed the Declaration on Research Assessment (DORA) or looked at things like the Leiden Manifesto or NISO yet, these should be high up on your agenda. But ultimately it's down to the individual researcher to 'stop breeding cobras', because that just contributes to a worse system.

Now, about Gimli. Has anybody not seen Lord of the Rings? There's a scene there where towards the end of the movie against all hope, the last of the good guys go to march on the gates of the bad guys, and it's a no hope situation. They're basically all worrying themselves to death, and Gimli says, "certainty of death, small chance for success, what are we waiting for?!", and they all march off and most don't die; and it's another perfect analogy for academia. We are told that you can't do various aspects of open science because they will harm your career; and that's due to these social internal barriers mentioned before. The effect of a divergent attitude which has been imposed upon us: **that people who want to innovate and explore and create or do good science are chased out of the system**. The effect is that all of us are straining in perpetuity as part of the status quo, and research suffers. Statistically less than 1-out-of-200 grad students will get a full-time professorship, according to recent research done in the UK. The question is then, why would you try and be the worst version of yourself via publish-or-perish to get a job that you're probably not gonna get because you are going to publish-and-perish anyways? Researchers become trapped in this cycle. We feel like we're forced to play the game because leaving academia is perceived as failure (Arnold 2015; Janz 2021). This leads to a reinforcement of the power imbalances, cultural inertia, commercial interest and governing systems of academia, and the cycle continues.

Can we break this cycle through training?

A paper published last year showed that in 60.8% of research articles published in global health journals, the researchers did not self archive, i.e., post a preprint, even though it was free and allowed within journal policy (Smith et al. 2017). This is life-changing research which researchers themselves are not sharing in a field where you would think access to knowledge is important for saving people's lives. We have to ask 'why?'. In the UK, a study showed that 93% of researchers believe that open access is important but less than half of that number have actually published in an open access journal (Zhu 2017). Why again this massive discrepancy? It is quite shocking that researchers can expressly promote open access but not practice it, even

when if you publish in an open access journal statistically you will gain an increase in citations (McKiernan et al. 2016). The same can be said if you share your data and your code openly. You make your work more reusable therefore more open to being cited. In a system where ‘dead cobras’ still count, this is a good thing for you. **A lot of people will counter this by saying ‘open access is too expensive.’ If you say that, all you are saying is that you can’t Google properly, because self-archiving costs nothing.** There are so many routes out there to free instantaneous sharing that help to level the playing field for everyone.

“I honestly don’t know, it just it blows my mind that researchers can promote one thing with one hand and then fail to uphold their own values with the other. And I don’t understand why, because all of the evidence points towards being open as enhancing your career”

-Jon Tennant, ‘[Open science is just good science](#)’

Now there are these policies and mandates saying ‘you have to publish your work open access’, and then publishers swooped in and said ‘we’ll give you open access for three thousand dollars a pop.’ **Why would you pay three, four or five-thousand dollars for something that you can get for free?** Preprints are amazing. Again, sharing is generally good for your career because you generate more citations faster. More importantly, you get free rapid communication for your research which could benefit society and its problems. There’s an explosion of preprint venues in the last five months. The concept here is that it’s your own work, don’t stick it behind a paywall. You do have choices to publish it where you want and the future is definitively going open, and you can already be a part of this.

Source (Xie, Shen, and Wang 2021), updated since Jon’s talk

On the left we have the exponential increase in the rise of preprints by platform, and on the right are preprints as a percentage of all papers by discipline. At the same time, open access mandates are appearing across the globe from funders, institutions and governments. Openness isn't going anywhere so you might as well ride that wave.

In summary

I think it's time to change the conversation because open science is pretty awesome. It increases the dissemination and reusability of your research and ultimately enhances your academic profile which is good for you. More importantly it helps to combat the reproducibility crisis, and makes you a better researcher both ethically and methodologically. It disseminates potentially life changing and saving knowledge freely to all.

The first step in achieving this is that we need to take responsibility and educate ourselves about open science or good science. This is one of the reasons I'm building this open science MOOC (Massive Open Online Courses) to help training and support and education for researchers around the world. We are going to hopefully use this to empower the next generation to become leaders in their own research fields. *There are challenges though*. We need to not just act within our own little communities, but act across them to increase interdisciplinarity and community building.

[speaking to the DARIAH audience specifically] I'm honored to be here with humanists and social scientists because I don't get to speak to you very often and I know that at the conferences I attend [paleontology] that humanists and social scientists often aren't invited and I think that's a real problem. We have this gulf between physical science, and humanities and social sciences. We need to be working together building bridges, not walls. **Open science for me is about breaking down barriers and generating equity in science.** Things that can help us to foster collaboration and increase the power of communities against the entrenched crap which we're all trying to fight against. This means we have to work together towards a common goal, ultimately that common goal for me is pooling knowledge and resources to create a decentralized scholarly infrastructure. With communities as the actual focus, then we can actually achieve the principles of open science.

Be that penguin. Don't hold back from trying new things; be one of those people who jumps into the water first because you'll be remembered amongst your community as a champion. *Be fearless Gimli.* The career pipeline is leaky anyway so why not diversify your skill set. Go out as an awesome researcher 'guns' blazing, or train yourself to become an awesome researcher through open scientific practices predicting what the future of your field is going to be rather than doing what professor X tells you to do because it worked 50 years ago. *Don't be a cobra*

farmer. Be focused on good science and responsible evaluation and let the quality of your research speak for itself.

What open science is

It's a tautology. Science was always open. This is where we want to get to in 10 years. We don't want open science to exist anymore eventually, because this is going to be the period when we woke up and realized that what we were doing before wasn't really science. It was anecdote, and we need to change that. **Science without open is just anecdote, open science is just good science** that's your take-home message.

Afterword – OS timeline updates

During and after Jon's 2018 talk and his passing in 2020, major changes took place that would reshape the science landscape. Two in particular are of centrality to Jon's core values about free knowledge communication, and reinforce that open science is actually good science. For one, and despite many lawsuits and attempted shut downs, Sci-hub has very little apparent impact on publishers' profits. The figure below is Elsevier's parent corporation RELX's revenue and earnings per share since 2016. Sci-Hub had massive usage throughout this time yet RELX's revenues continued to climb.

From RELX website, December, 2021

What happened in 2019 was not a sudden flocking to Sci-Hub. It was that most of Germany's institutions, the University of California and many other global institutions cancelled their Elsevier contracts. This clearly had a huge impact. At the same time, already in 2016, researchers on every continent used Sci-Hub *en masse* and had way more scientific knowledge in their possession than at any time prior (Bohannon 2016). This was a huge achievement for scientific communication, that still continues today. Why didn't Sci-Hub matter for corporate publishing profits?

Simple: Presumably those who use Sci-hub in the Global South and as members of less-well endowed institutions in the Global North do not have legal access to the articles they download. These institutions do not have the funding to have legal access, so whether the researchers at these institutes use Sci-hub or not, the institutes are not a current source of profit for publishers. Moreover, given the persistence of global inequality, it is unlikely that these institutes will ever afford subscriptions, thus they are not potential sources of profit either. For those who use Sci-hub at well-endowed institutions with subscriptions – maybe they are lazy,

unaware of the subscription or somehow unable to access their library (e.g., a VPN or technical glitch) – they are not cutting into profits. These universities already have subscriptions for the most part so when their researchers use Sci-hub, the publishers still profit. Thus, all the noise made by publishers about Sci-hub eating their profits is greatly overstated. The percentage of research available through legal open access channels has doubled or even tripled between 2015 and 2020, but one of the greatest achievements politically is Plan S supported by cOAlition S. This is a mandate that all funded research be open access as of 2021. This has completely shaken the for-profit megalithic publishing system and its role in Europe. Already, two of Jon's favorite targets, Springer Nature and Elsevier, have come to the table to offer solutions for researchers to be compliant with Plan S. Its not perfect as it still calls for often large APCs on the part of the author, but it allows the authors to retain CC BY rights to their work. We cannot expect science communication to be perfect, just like human nature, but we can in perpetuity strive to do just good science and continue to push publishers to reduce their fees as we move away from print distribution.

Endnotes

[1] This is one of Jon's more controversial claims. While there is evidence the public may have trusted science less heading into the 2010s, there is also a lot of evidence that trust has been stable for decades and of course that this varies greatly by country.

[2] And statistically underrepresented in the output. The exception being that female solo authors are not apparently penalized in the peer review and publication process itself.

[3] The evidence on this is mixed.

References

- Arnold, Carrie. 2015. "Feeling Stuck." *Science*.
- Bohannon, John. 2016. "Who's Downloading Pirated Papers? Everyone." *Science*. doi: 10.1126/science.352.6285.508.
- Brembs, Björn. 2018. "Prestigious Science Journals Struggle to Reach Even Average Reliability." *Frontiers in Human Neuroscience* 12:37. doi: 10.3389/fnhum.2018.00037.
- Breznau, Nate. 2021. "Does Sociology Need Open Science?" *Societies* 11(1):9. doi: 10.3390/soc11010009.
- Chan, Leslie, Budd Hall, Florence Piron, Rajesh Tandon, and Wanósts'a Lorna Williams. 2020. "Open Science Beyond Open Access: For and with Communities, A Step towards the Decolonization of Knowledge." doi: 10.5281/zenodo.3946773.
- Cookson, Robert. 2015. "Elsevier Leads the Business the Internet Could Not Kill." *Financial Times*, November 15.
- Dion, Michelle L., Jane Lawrence Sumner, and Sara McLaughlin Mitchell. 2018. "Gendered Citation Patterns across Political Science and Social Science Methodology Fields." *Political Analysis* 26(3):312–27. doi: 10.1017/pan.2018.12.
- Dodds, Francis. 2018. "The Changing Copyright Landscape in Academic Publishing." *Learned Publishing* 31(3):270–75. doi: 10.1002/leap.1157.
- Dolan, Kerry A. 1998. "Another Look." *Forbes*.
- Dutta, Mohan, Srividya Ramasubramanian, Mereana Barrett, Christine Elers, Devina Sarwatay, Preeti Raghunath, Satveer Kaur, Debalina Dutta, Pooja Jayan, Mahbubur Rahman, Edwin Tallam, Sudeshna Roy, Ashwini Falnikar, Gayle Moana Johnson, Indranil Mandal, Uttaran Dutta, Iccha Basnyat, Cheryll Soriano, Vinod Pavarala, T. T. Sreekumar, Shiv Ganesh, Asha Rathina Pandi, and Dazzelyn Zapata. 2021. "Decolonizing Open Science: Southern Interventions." *Journal of Communication* 71(5):803–26. doi: 10.1093/joc/jqab027.
- Engzell, Per, and Julia M. Rohrer. 2020. "Improving Social Science: Lessons from the Open Science Movement." *PS: Political Science & Politics* 1–4. doi: 10.1017/S1049096520000967.
- Fang, Ferric C., and Arturo Casadevall. 2011. "Retracted Science and the Retraction Index." *Infection and Immunity*. doi: 10.1128/IAI.05661-11.
- Janz, Dr Nicole. 2021. "Burnout Didn't Happen To Me — It Happened For Me." *Mind Cafe*. Retrieved January 4, 2022 (<https://medium.com/mind-cafe/burnout-didnt-happen-to-me-it-happened-for-me-dbc34ad1ac84>).

- Jewett, Andrew. 2020. "How Americans Came to Distrust Science." *Boston Review*, November 2.
- Kramer, Bianca, and Jeroen Bosman. 2018. "Rainbow of Open Science Practices," January 14.
- Lerback, Jory, and Brooks Hanson. 2017. "Journals Invite Too Few Women to Referee." *Nature* 541(7638):455–57. doi: 10.1038/541455a.
- McKiernan, Erin C., Philip E. Bourne, C. Titus Brown, Stuart Buck, Amye Kenall, Jennifer Lin, Damon McDougall, Brian A. Nosek, Karthik Ram, Courtney K. Soderberg, Jeffrey R. Spies, Kaitlin Thaney, Andrew Updegrove, Kara H. Woo, and Tal Yarkoni. 2016. "How Open Science Helps Researchers Succeed" edited by P. Rodgers. *ELife* 5:e16800. doi: 10.7554/eLife.16800.
- Monbiot, George. 2011. "Academic Publishers Make Murdoch Look like a Socialist." *The Guardian*, August 29.
- Normile, Dennis. 2018. "South Korean Universities Reach Agreement with Elsevier after Long Standoff." *Science*.
- Pownall, Madeleine, Catherine V. Talbot, Anna Henschel, Alexandra Lautarescu, Kelly Lloyd, Helena Hartmann, Kohinoor Monish Darda, Karen T. Y. Tang, Parise Carmichael-Murphy, and Jaclyn A. Siegel. 2020. "Navigating Open Science as Early Career Feminist Researchers."
- Ross-Hellauer, Tony. 2017. "Peer Review in the Age of Open Science," OpenAIRE.
- Schiermeier, Quirin, and Emiliano Rodríguez Mega. 2017. "Scientists in Germany, Peru and Taiwan to Lose Access to Elsevier Journals." *Nature* 541(7635):13–13. doi: 10.1038/nature.2016.21223.
- Schmitt, Jason. 2015. "Can't Disrupt This: Elsevier and the 25.2 Billion Dollar A Year Academic Publishing Business." *Medium*. Retrieved January 4, 2022 (<https://medium.com/@jasonschmitt/can-t-disrupt-this-elsevier-and-the-25-2-billion-dollar-a-year-academic-publishing-business-aa3b9618d40a>).
- Smith, Elise, Stefanie Haustein, Philippe Mongeon, Fei Shu, Valéry Ridde, and Vincent Larivière. 2017. "Knowledge Sharing in Global Health Research – the Impact, Uptake and Cost of Open Access to Scholarly Literature." *Health Research Policy and Systems* 15:73. doi: 10.1186/s12961-017-0235-3.
- Tennant, Jonathan, and Charlotte Wien. 2020. "Fixing the Crisis State of Scientific Evaluation."
- Vicente-Saez, Ruben, and Clara Martinez-Fuentes. 2018. "Open Science Now: A Systematic Literature Review for an Integrated Definition." *Journal of Business Research* 88:428–36. doi: 10.1016/j.jbusres.2017.12.043.

- Watson, Mick. 2015. "When Will 'Open Science' Become Simply 'Science'?" *Genome Biology* 16(1):101. doi: 10.1186/s13059-015-0669-2.
- West, Jevin D., Jennifer Jacquet, Molly M. King, Shelley J. Correll, and Carl T. Bergstrom. 2013. "The Role of Gender in Scholarly Authorship." *PLOS ONE* 8(7):e66212. doi: 10.1371/journal.pone.0066212.
- Xie, Boya, Zhihong Shen, and Kuansan Wang. 2021. "Is Preprint the Future of Science? A Thirty Year Journey of Online Preprint Services." *ArXiv:2102.09066 [Cs]*.
- Yarkoni, Tal. 2016. "Why I Still Won't Review for or Publish with Elsevier—and Think You Shouldn't Either." *[Citation Needed]*. Retrieved November 18, 2021 (<https://www.talyarkoni.org/blog/2016/12/12/why-i-still-wont-review-for-or-publish-with-elsevier-and-think-you-shouldnt-either/>).
- Zhu, Yimei. 2017. "Who Support Open Access Publishing? Gender, Discipline, Seniority and Other Factors Associated with Academics' OA Practice." *Scientometrics* 111(2):557–79. doi: 10.1007/s11192-017-2316-z.