

# Open science from the standpoint of the new wave of researchers: Views from the scholarly frontline<sup>1</sup>

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**Abstract.** Reports on the findings on the open science attitudes and behaviours of early career researchers (ECRs) from the Harbingers research project, which sought to determine whether they are the agents of change when it comes to scholarly communications. Nearly 120 science and social science researchers from 7 countries were questioned, longitudinally over a period of three years. The ECR findings are run against the received wisdom on open science emanating from relevant European Union institutions and funders and it was found that some confusion reigns and that there is a significant disconnect between what the institutions promulgate and what ECRs say and do, and, this, is largely because of reputational concerns.

Keywords: Early career researchers, scholarly communications, open science, open access, open data, scholarly reputation

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<sup>1</sup>This article is based on current research, which is continuing and will be produced in more detail at a future date. See (<http://ciber-research.eu/harbingers.html>) to keep in touch.

## 1. Introduction

Sometimes, it feels that decisions about scholarly communications are made on behalf of researchers by policy makers, research funders, librarians and, occasionally, publishers. Researchers, perhaps, not trusted to run their own lives, are expected to tow along. It seems that this might be happening in the case of open science. In the light of this, it is crucially important to examine open science through the fresh lens of the community of researchers to whom it counts the most - early career researchers (ECRs), the newest and biggest wave of researchers who will inhabit the projected bright new open scholarly world being built in their name. This is a community that, to date, despite its huge strategic importance has largely gone unheard and, instead, words put in their mouths and told how to behave in an open science world.

ECRs are a community that CIBER have been studying and interacting with for four years in the 'Harbingers' project (<http://ciber-research.eu/harbingers.html>), which sought to determine whether ECRs, with their Millennial beliefs of transparency, openness and sharing, are going to be the harbingers of change when it comes to scholarly communications. The project covered nearly 120 ECRs from 7 countries - China, France, Malaysia, Poland, Spain, UK, US, and, as part of it, we conducted annual, deep conversations about open science and its component parts, such as open access, open data and open peer review (details about the sample and methodology can be found in [2]). It is well worth listening to ECRs on open science, not just because of the strategic position they hold, but also because they are the community who have the most to do with the scholarly communications system because they are the research workhorses: they do most of the discovery work, undertake many of the authorship and publishing practices.

## 2. Definition and understanding

As we soon learnt, the trouble with asking ECRs about open science – and maybe part of the reason they are not asked - is that, like so many other researchers, they either do not know what is being talked about or, simply, misunderstand what it is about. Thus, there is no choice but to tell them, but, then again, what do you *actually* tell them, as even those charged with defining it do not agree among themselves. As a starting point, let us look at the definition provided by the main body pushing for open science – the European Commission. Their definition, which follows, reminds us that open science is as much a philosophy (warm feeling) as a collection of scholarly practices: *Open Science describes the ongoing transitions in the way research is performed, researchers collaborate, knowledge is shared, and science is organised. It represents a new approach to the scientific process based on cooperative work and new ways of knowledge distribution using digital technologies and new collaborative tools.*<sup>2</sup>

Of course, this motherhood and apple pie definition is not much when trying to help explain open science to researchers at the sharp end of the business, so let us move to a definition produced specifically for ECRs. Eurodoc, the European Council for Doctoral Candidates and Junior Researchers, provides this: *Open Science' is essentially an umbrella term for various practices such as Open Access, Open Data, Open Methodology, Open Source, Open Peer Review, Open Education, Alternative Metrics and Citizen Science.*<sup>3</sup>

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<sup>2</sup><https://ec.europa.eu/research/openscience/index.cfm?pg=open-science-policy-platform-faqs>.

<sup>3</sup><https://www.ingentaconnect.com/content/sil/impact/2018/00002018/00000006/art00024?crawler=true&mimetype=application/pdf>.

We have moved then, from a definition that lists nothing to one that lists everything, but the scholarly kitchen sink. The question now posed, is how do you ask about all these activities, many of which might be alien to ECRs (in name, anyway), and, as we well know from our research, altmetrics and citizen science fall squarely into this camp? It can now be seen, why it is best to take the results of the questionnaire surveys conducted on open science with a big pinch of salt. Instead, it is far better to ask ECRs what they do in the way of scholarly activities, press them on any salient points, make the judgement call on open science attitudes and behaviour for yourselves and, for triangulation purposes, back this up with verbatim quotes, which is what we have done in this paper.

### 3. ECR attitudes and behaviours

If (and that is a big if) you can overlook the problems of asking ECRs about it, in theory, anyway, open science should be welcomed with open arms because our research [1] shows it offers plenty potential benefits for researchers in their position: (a) a bigger/wider audience of readers because papers no longer hide behind unbreachable paywalls; (b) more reads, social media mentions and, it is argued, citations (ECRs' reputational currency) from an expanded audience; (c) improved chances of collaboration, the Holy Grail for many ECRs; (d) it offers a close fit with their Millennial views on transparency, sharing and level playing fields; (e) there are greater opportunities to publish because there are more outlets with more favourable (lower) levels of admission; and, (f) an enhanced visibility-associated reputation, which is much prized by this community. However, as we have found, it is only ECRs who have gone on to obtain a secure or tenured position who can really afford the time to practice open science.

What we actually discovered was that when it comes to open science it is, indeed, very early days for ECRs. Even given the increasing promotion of open science by the European Commission and force-feeding by funders, such as the Wellcome Trust, which, as it happens, does not seem to work with this community (mandates are not very Millennial), most ECRs display little understanding of what it means and little interest in the topic. And, it follows, that they think they do not even practise it. This state of affairs has changed only marginally over the past three years. Thus, for instance, UK and US ECRs' recognition of the term was slightly greater in 2018 than it had been in 2016, which was minimal, but they did recognise the concept of open peer review and, to a lesser extent, open data, but in the latter case they clearly did not really understand it because they thought that putting their data into a paper's supplementary materials, which they favoured, was open data, which it is not if the journal is a subscription-based journal. Heaping more confusion on the topic then. In fact, the extent of confusion can also be seen by the fact that some ECRs consider blogs and social networking sites, such as ResearchGate and Twitter, to be part of the open science agenda with, for instance, eight out of ten Polish ECRs believing this to be the case.

There is not only near complete confusion over what open science is, but there is also a degree of negativity, with French ECRs exhibiting antagonism, and mistrusting the whole agenda. One French ECR, speaking for others, felt it is "*A new means of imposing control and evaluation*". More damning, perhaps, is that some ECRs believe that it is opening the doors wide to criticism of their work and that in their precarious position "*who would want that?*" asked one. Others felt it was an open invitation to plagiarising and 'hippy science' ("*anyone who has a view, no matter what their knowledge base can comment?*"). Another ECR summed it up like this: "*I am wary of the role of technological innovations like this. We should consider the issue carefully and give some thought to aspects like: authorship, intellectual property and the quality of data that are published*".

Most probably, though, reputational concerns weight even greater for ECRs. The rapid building of reputation means a lot, of course, to ECRs striving for tenure and permanent positions in a highly competitive environment. So, while they are keen on open science in principle, they recognise that, in practice, for purposes of grants, promotion and tenure, for instance, open access publishing ranks low in the criteria for seeking a journal in which to publish their papers. The same goes for open data – they need the data for themselves to get out those high impact factor papers, which will ensure or advance their careers. They are also aware that data sharing needs an investment of time and they are not ready to spend time on reputationally “valueless” tasks.

That is not to say that there is no understanding of the topic, and those who did show it, largely saw it as a beneficial mechanism for disseminating, sharing and collaborating research, as these three quotes demonstrate: (1) *“Open science is meaningful for the researchers with insufficient funds and ECRs in the research institution. Because they can freely and discretionarily download the paper, data and software.”* (2) *“Yes, it means a lot. It breaks down the barriers to collaborating. For example, in the old days, researchers had to know a researcher to collaborate and come from a top university. Open Science allows people to freely spread their own ideas and collaborate.”* (3) *“Technology is now there; subscriptions are expensive and there is absolutely no excuse for not making scientists work available particularly to other scientists! This is the whole point of writing papers!”*.

Open access is the open science aspect that ECRs are most familiar with and this is partly to do with the fact that it has been around for a decade or so now and is plainly bedding in. Indeed, it is often seen, not to be just a component part of open science, but as another name for it. Yet, another degree of confusion to factor in. The data collected is conflicting, however, and the jury is still plainly out on some aspects of open access. The big attractions are though to be that open access is ethical (and this is a really big change over the past three years studied) and provides easy access to content, a larger audience for their work, greater visibility and higher (citation) impact. You can see a mix of societal, author and reader concerns at work here, illustrating further the complexity of the topic. Interestingly, few ECRs mentioned mandates as a reason for publishing open access, and this is because they tend not to be aware of them and/or are not keen on them for reasons of academic freedom (*what has happened to that one asked?*). Therefore, it is not clear whether Plan S, which came out after our interviewing was completed, will fall on deaf ears, but it is very doubtful that any of them would have concurred with the President of Eurodoc when he said: *“Plan S is a bold and ambitious move for researchers to take back control of access to scientific publications”*<sup>4</sup>. The idea of getting back control assumes they ever had full control, which they did not and, anyway, they are not that dissatisfied with publishers, who they generally trust. That is because the alternatives (funders, for instance) could be worse. Furthermore, our ECRs had very good access to libraries and databases and there are also plenty of sharing platforms, such as ResearchGate, for them to use when arrangements break down. Discovery and access are just not big issues for ECRs, not as they are for librarians. We have another case here of a disconnect between ECRs and the organisations that purport to support their best interests, but who could be argued just promote their own line.

Ironically, it seems that in an open world cost is seen as the biggest downside, even if ECRs do not have to pay the article processing charges (APCs) themselves and, of course, they are at the end of the queue when they are handed out. ECRs just do not like the idea of paying as it goes against the Millennial grain. Policies about such payment also differ. Malaysian ECRs, for example, will only publish in highly-ranked gold open access journals because the university will pay. APCs for hybrid open access journals

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<sup>4</sup><http://www.eurodoc.net/plan-s>.

are not reimbursed. Another irony and an example of unintended consequences, Spanish ECRs tell us that “*Publishing open access is making the field uneven*”. For them, APCs are a big drawback with those in small groups or in fields where funding is limited unable to afford the charges. They cannot compete with researchers that have money to publish open access and, therefore, obtain more citations, which in turn gives them a greater chance of promotion.

Another downside, is the fact that high impact factor open access journals, necessary for career advancement, are thin on the ground in many subject areas, as mentioned by a Malaysian ECR: “*We are rated by our ability to publish in IF [impact-factored] journals, OA [open access] journals are less established, it takes some time before these journals acquire a legitimate impact factor. They would not be of interest to researchers*”. Not surprisingly, most ECRs collaborate or are part of teams, and they look over their shoulders and question whether open access is the career route when everybody else are chasing high impact factor journals in order to build their careers. Thirdly – and this is an issue that has been growing over the three years of study - open access journals are being tarred with the predatory brush. Finally, there is a nagging feeling that open access (as we have also pointed out in the case of open science) opens ECRs to more criticism as a result of an expanded, more diverse audience and to greater risks of plagiarism, too. So, open access publishing can be a minefield.

Open data is more problematical because, while it generally thought to benefit science in the long run because of the reproducibility and re-use benefits, in the-here-and-now concerns about the need to maximise its value to the researcher and, less so, losing competitive advantage, acts as a drag anchor on practice. As one Chinese ECR put it: *Data is the most important intellectual asset in our field. Why share it? However, when I have fully exploited it and published my papers, I will give it to others, but it is really useless for others to use it.* The fact that they are not mandated to do it and the nature of data (i.e. confidential, national security related) prohibits sharing does not help either. As a consequence, only around one-third of ECRs make their data openly available and they do it mostly by means of publishing as supplementary materials to a paper, so, maybe not that open.

Open peer review is the most problematical of all and double blind much preferred. This is because ECRs do not to welcome the visibility open peer review brings with it as it could have (negative) reputational consequences for them, as explained by a French ECR: *Open peer review is tricky because you engage your own reputation as a reviewer.* Anonymity is thought to provide greater opportunities for young researchers and women, giving them some shelter in a combative scholarly world. French ECRs in particular are very cautious and suspicious of anything labelled as ‘open’. There is a sense that by opening the door to all meant anything could happen. After all reviewers could be hounded on the social media. That is not to say there are no wholehearted supporters of open peer review and this ECR illustrates why some support it and this is largely for transparency reasons: “the current review system does not negate negative biases. I know at least one fellow academic that I would not trust to review our work with integrity although he is an expert in the field. I like the open review system, I salute journals that identify the reviewers with the manuscript they reviewed, make their comments available online”.

As for Citizen Science, it would come as a surprise for ECRs to learn that it was a component part of open science and they would worry about where ‘open’ might end up. Same, too, for altmetrics, that is if they knew what it is, and most do not.

#### 4. Challenges and conclusions

The data we have presented here may appear conflicted and confusing in parts and this is because we need to bear in mind that ECRs have two minds (split personalities, possibly?) when it comes to open science and its component parts. Thus, for instance, in respect to open data they are largely positive in attitude (because it fosters reproducibility), but protective in practice (because of the inevitable competitiveness among researchers chasing reputation and career advancement). This clearly means that in their role as researchers they are positive about using other researchers' data, but, as authors, they do not want to share their own data until it is well past the sell by date. The same thing can be said about open peer review. In theory, it is good (transparent) but, in practice, dangerous (too much exposure). Similarly, open access publishing is excellent for reading purposes, but less good for publishing purposes.

Open access has been with us for more than a decade now and yet it is only just managing to find its feet and it is yet to reach the scholarly communications top table, so we are not holding our breath that open data, open peer review et al. will become the norm any time soon. Reputational concerns and competitive worries and widespread confusion will ensure this. While some of the concerns about open access could be addressed (e.g. with time, outlets and quality will increase and predatory journals might be purged or listed properly), the issues associated with open data and open peer review appear more fundamental, for ECRs anyway.

Nevertheless, a number of countries (e.g. France, Malaysian and Poland) are rolling out open science national plans, and funders will expect compliance down the line, but that will only come if the current reward system is changed to provide incentives to think and practice open science. And open science suggestions, such as to give reputational credit for the number of grants applied for rather than the numbers won are not going to advance its case one bit. It is all about reputation for academics and citations are the reputational currency and especially so for universities wanting to climb the world university league tables – and they all do.

Finally, there is a bigger problem, which seems even further away from resolution. Open science sometimes appears to be all about the wholesale dismantling of the traditional scholarly system with its paywalls, gatekeepers, brand names, copyright concerns and exclusivity. This, however begs the question, who then polices, regulates or gatekeeps the new open scholarly system? ECRs actually trust publishers – the existing gatekeepers - much more than they trust learned societies, research funders, libraries or even the crowd to do this. There are fears of working in a borderless environment where the controls are off. And, remember, open access ushered in predatory journals, so what else is going to be coming through the open door and who is going to deal with it? Maybe, just maybe – and ECRs would concur with this, sometimes walls make sense, so we should be careful before pulling them all down.

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