Reflections on Open Research – a PI's perspective

As part of the Open Research Pilot Project, Marta Teperek met with Dr David Savage and asked him several questions about his own views and motivations for Open Research. This led to a very inspiring conversation and great ***reflections on Open Research from the Principal Investigator's perspective****. The main points that came out of the discussion were:*

- Lack of reproducibility raises questions about scientific rigour, integrity and relevance of work in general
- Being open is to work in a team and be collaborative
- Open Research will benefit science as a whole, and not the careers of individuals
- Peer review remains a critical aspect of the scientific process
- Nowadays, global collaboration and information exchange is possible, making the data really robust
- Funders should emphasise the importance of research integrity and scientific rigour

This conversation is reported below in the original interview format.

Motivations for doing Open Research

Marta: *To start, could you tell me why you are keen on Open Research and why did you decide to get involved in the Open Research Pilot Project?*

David: Sure, but before we start I wanted to stress that when I make comments about science, these are very general comments and they don't apply to anyone in particular.

So my general feeling is that I am very concerned and disappointed about the lack of research reproducibility in science. **Lack of reproducibility raises questions about scientific rigour, integrity and relevance of work in general.** Therefore, I am really keen on exploring ways of addressing these failings of science and I want to make a contribution to solving these problems. Additionally, I am aware that I am not perfect either and I want to learn how I can improve my own practice.

Were there any particular experiences which made you realise the importance of Open Research?

This is just the general experience of reading and also reviewing far too many papers where I thought that the quality of underlying data was poor, or authors were exaggerating their claims without supporting evidence. There is too much hype around, and the general awareness about the number of papers published in high impact journals which cannot be reproduced makes the move to more transparent and open approaches necessary.

Do we need additional rewards for working openly?

How do you think Open Research could benefit academic careers?

I am not sure if Open Research could or should benefit academic careers – this should not be the goal of Open Research. The goal is to improve the quality of science and therefore the benefit of science to the public. **Open Research will benefit science as a whole, and not the careers of individuals.** Science has become very egotistical and badge –accumulating. We should be investigating things which we find interesting. We should not be motivated by the prize. We should be motivated by the questions.

In science we have far too many people who behave like bankers. Publishing seems to be the currency for them and thus they are sloppy and lack the necessary rigour just because they want to publish as fast as they can.

In my opinion it is the responsibility of every researcher to the profession to try to produce data which is robust. It is fine to make honest mistakes. But it is not acceptable to be sloppy or fraudulent, or not to read enough literature. These are simply not good enough excuses. I'm not claiming to be perfect. But I want to constantly improve myself and my research practice.

Barriers to greater openness in research

What obstacles may be preventing researchers from making their research openly available?

The obvious one is competition for funding, which creates the need to publish in high impact factor journals and consequently leads to the fear of being scooped. And that's a difficult one to work around. That's the reason why I do not make everything we do in my research group openly available. However, looking at this from society's perspective, everything should be made openly available, and as soon as possible for the sake of greater benefit to mankind. So balance needs to be found.

Do you think that some researchers might want to make their research open, but might not know how to do it, or might not have the appropriate skills to do it?

Definitely. Researchers need to know about the best ways of making their research open. I am currently trying to work out how to make my own project's website more open and accessible to others and what are the best ways of achieving this. So yes, awareness of tools and awareness of resources available is necessary, as well as training about working reproducibly and openly. In my opinion, **Cambridge has a responsibility to be transparent and open about its processes**.

Role of peer-review in improving the quality of research

What frustrates you most about the current scholarly communication systems?

Some people get frustrated with the business model of some of the major publishers. I do not have a problem with it, although I do support the idea of pre-print services, such as bioRxiv. Some researchers get frustrated about long peer-review process. I am used to the

fact that peer-review is long, and I accept it because I do not want fraudulent papers to be published. However, flawed peer review, such as biased peer-review or lack of rigorous peer review, is not acceptable and it is a problem.

So how to improve the peer-review process?

I think that peer-reviewers need to have greater awareness of the need for greater rigour. I was recently asked to peer review an article. The journal had dedicated guidance for peer reviewers. However, the guidance did not contain any information about suitability to undertake the peer-reviewing work. Peer-reviewer guidance documents need to address questions like: Do you really know what the paper is about? Do you know the discipline well enough? Are there any conflicts of interest? Would you have the time to properly peer-review the work? Peer-review needs to be done properly.

What do you think about the idea of journals employing professional peer-reviewers, who could be experts in their respective fields and could perform unbiased, high quality peer-review?

This sounds very reasonable, as long as professional peer-reviewers stay up to date with science. Though this would of course cost money!

I suppose publishers have enough money to pay for this. Have you heard of open peer-review and what do you think about it?

I think it is fine, but it might be subject to cronyism. I suspect that most people will be more likely to agree for their reviews to be made open as long as they make a recommendation for the paper to be accepted.

I recently reviewed a paper of a senior person and I rejected it. But if I made my review open, it would pose a risk to me – what if the author of the paper I rejected was the reviewer of my future grant application? Would they still assess my grant application objectively? What if people start reviewing each other's papers and start treating peer-review as a mechanism to exchange favours?

The future of Open Research is in your hands

Who or what inspires you and makes you optimistic about the future of Open Research?

In Cambridge and at the Wellcome Trust there are many researchers who care about the quality of science. These researchers inspire me. These are very clever people, who work hard and make important discoveries.

I am also inspired by teamwork and collaboration. In Big Data and in human genetics in particular, people are working collectively. Human genetics and epidemiology are excellent examples of disciplines where 10-20 years ago studies were too small to allow researchers to make significant and reproducible conclusions. **Nowadays, global collaboration and information exchange is possible, making the data really robust**. As a result, human genetics is delivering really important observations.

To me, part of being open is to work in a team and be collaborative.

If you had a magic wand and if you could get one thing changed to get more people share and open up their research, what would it be?

Not sure… I suppose I am still looking for it! Maybe I will find one during the Open Research Pilot Project. Seriously speaking, I do not believe that a single thing could make a difference. It is the little things that matter. For example, on my side I am trying to make my own lab and institute more aware of reproducibility issues and ensure that I can make a difference in my own environment.

So as a Group Leader, how do you ensure that researchers in your own group are rigorous in their approach?

First, I really make them aware of the importance of reproducible research and of scientific rigour. I am also making a lot of effort to ensure that my colleagues are up to date with literature. I ask them if they read important literature and if they are unable to answer I ask them to do their homework. I am also imposing rigorous standards for experiments. In my lab people repeat the key experiments, or those which are particularly surprising, in a blind fashion. It takes a lot of time and extra resources, but it is important not to be too quick and to validate findings before making claims.

I am also ensuring that my people are motivated. For example, even though everyone helps each other in my group, all PhD students have direct access to me and we have regular discussions about their work. It is important that your group is of a manageable size; otherwise, as a group leader, you will not know all your people and you will not be able to have regular discussions about their work.

How do you identify people who care about reproducible research when making hiring decisions?

I ask all prospective applicants to make a short presentation about their previous work. During their presentation I ask them to tell me exactly what their research question was and how confident they were about their discovery. I am looking for evidence of rigorous methodology, but also for honesty and for people who are not overselling their findings.

In addition, I ask about their career goals. If they tell me that their career goal is to publish in *Nature,* or have two papers in *Science*, I count this against them. Instead, I favour applicants who are question-driven, who want to make progress in understanding how things work.

Role of funding bodies in promoting Open Research

Do you think that funders could play a role in promoting Open Research?

Funders could definitely contribute to this. The Wellcome Trust is a particularly notable example of a funding body keen on Open Research. **The Trust is currently looking into the best ways to make Open Research the norm.** Through various projects such as the Open Research Pilot, the Trust helps researchers like myself to learn best practice on reproducible

research,and also to understand the benefits of sharing expertise to improve skills across the research community.

Do you think funder policies to mandate more openness could help?

Potentially. However, policies on Open Access to publications are easy to mandate and relatively easy to interpret and implement. It is much more difficult for Open Research. What does Open Research mean exactly? The right scope and definitions would be key. What should be made open? How? The Wellcome Trust is already doing a lot of work on making important research results available, and human genomic data in particular. But making your proteomic and genomic data publicly available is slightly different from ensuring that your experiments are rigorous and your results honest. So in my opinion, **funders should emphasise the importance of research integrity and scientific rigour.**

To close our discussion, what do you hope to achieve through your participation in the Open Research Pilot Project?

I want to improve my own lab's transparency. I want to make sure that we are rigorous and that our research is reproducible. So I want to learn. At the same time I wish to contribute to increased research integrity in science overall.

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