

# 13 Taking the Leap: The Benefits of Open Science

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We, as scientists, are problem solvers. When we find something that does not work, we think about a way to fix it. This might seem like a very straightforward way to describe our jobs as scientists, but problem solving is common to all scientists, no matter the field. However, when the problem is about science itself, how do we fix it? Let's face it, most research teams work *in silo*, not sharing their hard-acquired data. Scientists perform *pro bono* reviews of scientific papers for billionaire publishing corporations. And authors of those reviewed papers will probably never know who did that peer review. Even more sadly, scientists will publish their work in scientific publications which they sometimes cannot even access. Open science has the possibility to fix a lot of what is wrong in science. This could be achieved in three different ways, which could have major benefits to the academic community: open data, open review, and open access.

In a few decades, open data should have become the norm rather than the exception. This principle has so much to offer. Of course, some data cannot be shared, such as private information or sensitive data. But sharing anonymized data offers the opportunity of worldwide collaborations and would maximize transdisciplinarity. Meta-analytical research is an area that would greatly benefit from globalized open data. Individual participant data meta-analyses have many advantages over traditional meta-analyses [1], but are difficult to conduct given the limited access to individual participant data from other studies. Having access to such data would allow scientists to make much more advanced analyses and expand the impact of their findings. Furthermore, it is an open secret that research funding is critical in many areas. Since an important proportion of research funding is used toward data acquisition, open data would allow to maximize the usage of acquired data, and therefore make an optimal use of taxpayers' money. It would also allow scientists with limited funding to pursue research on publicly shared data.

Open review should also become more frequent in the coming years. Scientists should not hide behind anonymity to criticize the work of another scientist. In my mind, open reviews would lead to more honest and constructive comments. The review system used by Frontiers journals constitutes a step in the right direction. By having a platform where authors can exchange with the reviewers, it is easier to understand what is wanted by the reviewers and how to perform the required

changes. Authors can explain why they made a certain choice and could therefore modify a reviewer's recommendation. Such back-and-forth communication between authors and reviewers can lead to a significantly improved paper. Review reports should also be published alongside papers. By knowing that their names and review would be published, reviewers would be highly rigorous during the peer review process. It would also allow the reader to understand the creative process that led to the final version of the article, as they would find useful information in the review report [2].

Finally, an important way toward globalized open science is the open access to scientific publication. Open access to science should be mandatory. Most research is financed by taxpayers, through federal funding agencies. It is a nonsense that those who pay for research don't have access to it [3]. I feel that most scientists agree that the open access system constitute the best avenue for the future of science and should therefore be prioritized. Yet, for various reasons, scientists' old habits are difficult to change. If we could close all existing journals and start on new foundations, I think that scientists would choose the open access system over the traditional publishing system. From my point of view, it appears that two factors may actually limit the willingness of scientists to publish in open access journals: impact factors that can be lower than in other journals and publishing costs. Even though the usefulness of the impact factor is largely debated, it remains used by many scientists to choose the journal where they wish to submit a manuscript. For open access journals to gain ground on traditional journal, much must be done regarding the prestige and impact of publications. This could be performed by using new metrics to measure publications' performance and journal impact, instead of the highly criticized journal impact factor. But this is a whole other debate.

Paying for publication is a mandatory feature of open-access publishing. Scientists understand why they must pay, and they agree with the principle. But in practice, when comes the time to submit a manuscript, saving some money might become tempting, given the precarity that many scientists must deal with. A solution to this problem could be provided by universities. By providing a monetary incentive or a compensation, they would encourage scientists to publish more in open access journals. By progressively cancelling subscriptions to major publishing companies, they could offer such incentives. For example, through a recent agreement between Frontiers, the University of Vienna and the Austrian Science Fund, article processing charges are now covered for Austrian scientists who wish to publish their findings in Frontiers open access journals. This type of policy, which constitutes a major step toward open science, should be emulated by other countries.

All in all, open data, open review, and open access can all have a positive impact on scientific research. It depends on us, as scientists, to take the necessary measures to implement these principles in our research and publishing habits. After all, we might be the ones who would benefit the most from it.

## References

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