Journal Article

ScienceMatters – Single observation science publishing and linking observations to create an internet of science

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Publication Date:
2016-12-12

Permanent Link:
https://doi.org/10.3929/ethz-a-010748900

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End of 2013, Nobel Prize winner Randy Schekman publicly complained about the inefficiency of the academic publishing industry [1]. He claimed that from now on, he would not publish in the top-tier journals like Nature, Science and Cell anymore, because they distort the scientific process and are a “tyranny that must be broken”. A few other Nobel Laureates including Sydney Brenner and Peter Higgs have also raised similar concerns. While it is the first time a Nobel laureate was so vocal about the science publishing platform, and it isn’t without its own controversy (many observed that Schekman had himself published several papers in Nature, Science and Cell which undoubtedly paved the way to his Nobel prize, and that he was also using this occasion to promote his own newly founded journal eLife), numerous scientists – from graduate students to full professors – feel a deep dissatisfaction when the system demands that we publish science in high-impact journals.

Clearly, the fight might seem for one thing: that we should publish our scientific findings without artificial barriers put up by the publishers. This fight has become so ugly and widespread that its consequences include the appearance of more and more predatory journals and alternative ways of publishing. Of course, the question as to what is predatory remains up for debate – for many, these are mushrooming journals with no or low quality control, which thrive on the authors’ paid article processing charges (APCs). There are a gazillion ones in recent years – and Jeffrey Beal, the librarian associated with the University of Colorado Denver who maintains a list of predatory publishers, has very recently been embroiled in a dispute with the Frontiers publishers, after listing some of their journals in the predatory list. For some, even journals that are reputed and have a decent review system, but charge the authors an APC of more 5000 USD for just a single paper (with 3 or 4 figures), also come close to being predatory, given that these journals are open access and don’t have any printed version – so, the question is why such high costs for publishing on-line a content that the researchers entirely provide. The publishers claim that, by making the scientific content of the paper open-access, they have to charge the authors such an exorbitant amount.

This brings me to the other dark side of the science publishing – the closed or paywalled access of scientific contents. Publishers place artificial barriers not only in selecting the best, the sensational and the incredible (sometimes, literally so) stories that are expected to be of interest to the audience and, to some extent, also to be cited more and hence contribute to the increase in the impact factor, but they also actively place barriers for accessing published knowledge – in other words – there are barriers for creating knowledge as well as for accessing knowledge. This, in 2016, is just neither possible nor justifiable. Hence, ScienceMatters.

ScienceMatters was created to provide a free path to publishing solid and well validated observations, be they orphan, negative, confirmatory or contradictory ones, and to keep them openly accessible to anyone in the world. With single observations, we aim to democratise science and, to some extent, also to de-elitise it. What science and researchers need is a quick and easy way to publish their findings, and with ScienceMatters it is now possible. When a researcher makes an observation, he/she can publish it provided that it passes a relatively fast but thorough peer-review process. The publication criterion is the soundness of the observation rather than solely its significance. We believe that all robustly validated scientific observations should be published, regardless of their immediate or perceived impact. Hence we allow all observations to be published. However, the observations are ranked on account of their peer-review scoring (1–10, 10 being the highest), the score being based on three different measures: technical quality, novelty and impact. For example, for a paper to be to be eligible for publication in Matters, it needs to have at least a 4/10 on the technical quality and this alone is sufficient. If the observation scores 8/10 or above on all the categories, then it will be published in Matters Select. In this way, the nature/quality of the observation alone determines where it is published.

Furthermore, we introduce real-time publishing, which is making science in steps, akin to the lego TM building of science. The single observations submitted by authors are developed into stories in real-time, allowing
the story to develop progressively instead of demanding that a full story be submitted all at once from the start. After publishing a single observation, authors submit subsequent/related observations as horizontal links, i.e., linked observations provided by the same authors as the original core observation and that continue to build the story in real-time. They develop the original observation into a full story, but each observation is published independently of the story context and immediately citable. Other researchers may also pursue the observation with confirmatory, contradictory or extending data as vertical links. As a result, a narrative emerges that is more truthful, more collaborative and more representative of the complexity of scientific phenomena – similar to the network of an internet of science, except that the observation nodes are all peer-reviewed. This is what ScienceMatters aims at – creating an internet of science where all the observations are reviewed but also quantitatively scored based on the technical quality and impact.

Now, one can imagine a metric based on ScienceMatters – not depending on where the data are published (as is currently done) but depending on what kind of observation is published:

1. By allowing both confirmatory (positive) and contradictory (negative) data to be published next to the original observation (seeding node), the seeding node gets extended. As illustrated in Figure 1, our visualization algorithm enables the seeding node to be linked through edges that can either be positive (green edge) or negative (red edge). If a particular seeding observation can be reproduced by, say, five different groups (and not by one single group), then this seed has a high confirmatory score indicating that it is reproducible. However, if the seeding observation cannot be reproduced by many groups and has mainly contradictory links, then it has a low confirmatory score and a high contradictory score. We believe that this is important, as such identification measures could enable or even predict the success or failure of clinical trials or the translatability of the findings. In addition, we created Matteric\textsuperscript{TM}, the metric that measures the “seeding potential” and the “extension potential” of both the author and the observation itself. Seeding potential refers to how powerful a seeder an author/observation is, i.e. how many further links were based on that particular node. For example, imagine that a rural researcher in Indonesia, without much knowledge about molecular biology or mechanistic insight, discovers that a certain herbal extract has the potential to reduce psoriasis, and publishes this “single but robustly validated observation” in Matters. Assume that this observation is extended by others in terms of mechanistic insights, identifying molecular and immunological basis, industry trying to replicate the observation in other cohorts, and pharmaceutical chemists isolating the very compound or a mixture of compounds responsible for the activity. Then, this particular study from the rural Indonesian researcher and her/his single observation would qualify as a great “seeder”. And how far that researcher extended the observation is another measure of focus and persistence. We combine these two factors in the Matteric\textsuperscript{TM}, which we believe is a much better and a more direct measure of impact than the existing “journal’s impact factor”.

2. And the post-publication public review: In addition to the pre-acceptance peer-review and the post provisional acceptance pre-publication public review, all articles published in Matters and Matters Select will also have a possibility for the public to post comments, reviews, shares or likes (upvote).

Thus, ScienceMatters comes in timely with its innovative concept of single-observation publishing to address many aspects of the crisis in science – however, two things are capital in bringing this innovation to be implemented: Money and mindset. While money can be bought, borrowed and even made, changing mindset is a challenge, and particularly that of scientists. But we remain optimistic as this is the only way to bring in the change.

References

Citation: Rajendran L: ScienceMatters - Single observation science publishing and linking observations to create an internet of science. Infoncepts 2016, Special Issue 1, 43-44, DOI: 10.3929/ethz-a-010748900
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