

## Scientific Practice in the Time of COVID-19: It's Time to Commit to Change

Daniel J. Dunleavy, Jonathan P. Tennant, Wojciech Francuzik

The COVID-19 coronavirus ([SARS-CoV-2](#)) outbreak has become yet another pandemic to hit in the last decade, following [Ebola](#), [Zika](#), and many others. In the wake of this challenge, scientists around the world are uniting in a heroic effort to help combat the outbreak. Data, software, materials, and research [articles](#), are being shared rapidly and freely, and peer reviewing of new research is happening at [an unprecedented pace](#), thanks to widely-available Web-based technologies. These practices are collectively known as *open science*. This is a very different picture than that of the contemporary scholarly system, in part an artefact of the pre-internet era, which by and large permits research data to be kept private, articles to be locked behind paywalls, and peer-review to be performed in a slow, secretive, and inefficient manner. In other words, *closed*, proprietary, science.

This mobilization of our collective technical and intellectual resources has greatly enhanced our understanding of this deadly disease and undoubtedly saved the lives of many. While there is precedent for research communities to become [more cooperative](#) in times of crisis, the present situation lacks an obvious comparator in terms of scale, speed, or openness. But the inescapable question emerges: “Why is *open science* not the default setting for all [global](#) social and biomedical challenges?”. Why does it take another pandemic and global health crisis to encourage researchers to share their work and collaborate to solve problems? And further, if we know that we have the capacity to share science, why are we not doing so?

To answer these questions, we can look at our current scholarly publishing and communication system, a system which continues to make unbounded profits. For too long now the term ‘publish’ in science has not meant *to make public*, but rather to privatize. By one estimate, only a mere [27.9% of all journal articles are open access](#). The failure of the majority of publishers to perform this basic function of making knowledge public is made apparent by scholarly [pirates](#) taking up the burden to help relinquish thousands of research articles from behind paywalls for public use. Yet, what these ‘pirates’ do is classified as illegal, while the publishers who prevent access to potentially life-saving knowledge are operating completely within the law. This is not hyperbole. Earlier this year, a large number of publishers [wrote to](#) President Trump asking them to permit them to delay public access to research for 12 months in order to protect their business interests. This goes directly against the apparent commitment that many of those same publishers had made to make research available during times of health crises. Take a moment to imagine what life would be like in China, South Korea, Italy, the U.S.A., and every other country impacted by COVID-19, if research on the disease was unavailable until January 2021.

How many more outbreaks do we need before we change this? How many more lives need to be lost? And what of other societal problems? Climate change continues onward. Economic inequality remains commonplace. Health problems, like mental illness and cancer, appear largely intractable. Solving these problems, which affect all of us, requires a level of cooperation and openness that, until now, has been unseen.

As a collective research community, we have been apathetic to and inactive on this problem for too long. We are producers and consumers of scientific research, but foremost, we are global citizens. We should welcome and encourage the sharing of data, software, ideas, and articles, and collaboration in real-time. We should encourage shifts in entrenched research practices and culture and embrace innovative dissemination technologies. Indeed, these changes could be said to embody the [very essence](#) of the scientific enterprise; whereby scientists are actively and continuously in a state of communal engagement and “focused disputation” with each other’s work, in an effort to improve the world.

But to truly maximize these benefits, such changes [must extend](#) beyond the context of the coronavirus outbreak. The response from researchers around the world shows us that everything we need to achieve open science already exists. Our world is more interconnected than ever. There will be future crises. We must commit to change and continue forward. This responsibility is all of ours.