Additive creation of new knowledge by Open Science, and transforming science and society

*Kazuhiro Hayashi[1]

1. National Institute of Science and Technology Policy

I often talk about the 2020s as being similar to a period in the 17th century: a learned society (the Royal Society) was born in 1660, and an academic journal (Philosophical Transactions) was founded five years later in 1665. In the 1660s, Newton and Leibniz invented calculus, and mathematics and physics were combined (mathematical physics), which had a great impact on modern science and the Industrial Revolution. In London, there was an epidemic of glandular plague in 1665-66, and it is said that Newton, who was unable to go to university, came up with the Law of Universal Gravitation as a result of his contemplation at his home. There are various theories as to how academic societies and journals were born, but it is said that academic societies began as salons that met in cafes for free discussion due to the rigidity of the universities of the time, and that academic journals were born as a way of consolidating the preemptive rights secured through the exchange of letters that became popular. In other words, it can be said that a creative destruction of research media and research communities occurred, and later universities (research institutions) were also reconfigured.
Looking at the present day from this historical perspective, the rigidity of universities and academic societies has once again been called into question with COVID-19, and the nature of academic journals and peer review has also been questioned again. On the other hand, more free and rapid exchange of information through academic SNS and preprints has begun. Alternatively, the fusion of AI (informatics) and existing science, and the fusion of the humanities and sciences is progressing, creating industries linked to new research. Furthermore, the automation of research by robots is progressing, and the code is attracting attention as a potential research medium with high reproducibility. In other words, as the means of sharing knowledge among researchers and with society are transformed, a new science and society will emerge. And the potential for research media, research communities, and institutions to be reconfigured is very high, and we believe that those adapting to this trend will survive.
In particular, open science and data-driven science are not only making conventional science more efficient by utilizing more open knowledge and data, but are also bringing a new dimension to science. Among that, the recent remarkable progress in research automation (ARW: Automated Research Workflow) is accelerating the process of acquiring scientific knowledge by an order of magnitude through the integration of artificial intelligence and other advanced digital technologies, robotics, and other technologies. At first glance, this trend tends to focus on improving the "labor-intensive work of knowledge production" by increasing the efficiency of experiments by a factor of more than 1,000, but it is necessary to look beyond that. In other words, the initial working hypothesis, which has been empirically determined by humans through a large number of experiments, is generated from a large amount of data, and new hypotheses are generated from the results to optimize the experiments without human intervention. Or, by searching through an overwhelmingly large amount of information that is beyond human perception, new insights can be gained more efficiently. This also means that the creativity of scientists, which is expressed somewhat mysteriously by the expression "serendipity," can be digital-transformed, as it frees researchers from the "labor-intensive work of knowledge creation.” The creative destruction of academic societies, journals, and universities that reconfigure science and society is likely to progress as the very nature of human knowledge production is transformed, and how to adapt to this paradigm shift will be crucial. On the other hand, we believe that this transformation will progress in an additive manner for some time, and that the mechanism for creating new science and society will be

cultivated along with the generational change, while streamlining the social progress of science to date.

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