Five lessons from four centuries of journal publishing – What the history of the Philosophical Transactions tells us about academic publishing

Drawing on research from their recently published and open access history of publishing at the Royal Society, **Camilla Mørk Røstvik***, discusses how a long view of scientific publication can help us better understand and better respond to current controversies in scholarly publishing.*

Academic publishing is a peculiar beast. Some is free to read, some behind a paywall, some is blind reviewed, some not. Some older articles are hard to find, some are duplicated, others entirely gone. Publishers make profits, while scholars make no money from their publications at all.

Our project began with the aim of studying the 350-year history of the Philosophical Transactions, often referred to as 'The world's oldest scientific periodical'. Over time though, it became clear that this example is of direct relevance to the larger history of scholarly publishing, an industry itself often accused of living in the past. Researching its history in the Royal Society archives resulted in many findings, here we offer five lessons from the centuries we explored as a multi-disciplinary team:

Scientific publishing was always international

Philosophical Transactions began life in 1665 in London. However, at least half of the material in the early journal originated in a language other than English. The journal soon became an entrenched part of the European Republic of Letters. Extracts from the journal were recopied into other European vernaculars, a Latin edition was mooted (and actually attempted). By the end of 1673, the format, periodicity, and scope of the journal were largely established, it was highly esteemed across the Continent. Being international, linguistically flexible and open, has thus been a merit and strength in academic publishing for centuries. However, this early internationalism of European journals seldom included, for instance, colonies and developing countries, which prefigures today's debates around, bibliodiversity and imbalances between publishing in the Global North and South. While the notion that global reach and communication was a positive and important side of academic publishing, the question of how and who decides what is included has always been under negotiation.

Peer review was not always part of publishing

The processes of publishing an article in the *Transactions* were gradually formalised and not settled from the start. These included norms for submission and evaluation, including systematic peer review by the middle of the 19th Century. As such, the stamp of the individual editor, which can often be discerned in the early journal, disappears as editorial responsibility was transferred to a Committee of Papers. While not exactly the same as contemporary peer review, this change did mean that a group of experts evaluated the merits of the paper. This slight broadening of shared responsibility lay the groundwork for future changes, but did not yet include anonymous reviewing or structures for evaluation based on distinct criteria.

The process of determining which papers should be published, and where, continued to change and develop into the late nineteenth and early twentieth centuries. As we consider the early twentieth century, we see that, in some cases, rather than instigate a new system of reviewing, old and previously abolished practices for choosing the most appropriate papers were re-utilised. This reminds us that the golden standard of publishing and reviewing today, are in fact social and relatively late constructions.

Image Credit: Photo collage, Frontispiece to Volume 1 of Philosophical Transactions via Wikipedia (CC BY 4.0 licence), A printing press: seen from the side. Engraving by R. Benard after L.-J. Goussier. Credit: Wellcome Collection. Public Domain Mark, Printing: inking the type and operating the press (above), plan of the press (below). Engraving by R. Benard after L.-J. Goussier. Credit: Wellcome Collection. Public Domain Mark, Printing: a three-quarter view of a press. Engraving by W. Lowry after J. Farey, 1819. Credit: Wellcome Collection. Public Domain Mark.

Likewise, the contemporary development and critique of peer review carries on this tradition. Debates about anonymous peer review (blind in some fields, double blind in other disciplines), the role of the editor (powerful in some journals, less so in others), and the size and scope of the journal (limiting the number of articles in some places, and necessitating the need for more elsewhere) continue to this day. Therefore, when we say ‘peer review’ today – whether referring to contemporary or past systems – we are in fact referring to changing systems of quality control that are not fixed.

For a long time, publishing scientific research made no money

The Society found the journal to be a money-losing proposition early on. It cost, on average, upwards of £300 a year to produce, of which they seldom recouped more than half. Because two-fifths of the copies were distributed for free to the journal's natural market, sales were generally slow, and although back issues sold out gradually it would usually be ten years or more before there were fewer than 100 left of any given print run. The problem was perhaps compounded by the fact that contributors were allowed to take off-prints (copies of individual papers that were part of a whole journal) of their papers for their own use; a Council decision of 1773 limits this to 100 copies (a strikingly high figure). Prices fluctuated with the size of the volume, from 7 shillings in some cases to £1 in others! Clearly not an excellent business model, but this was also not the point of early scientific dissemination – somewhat in contrast to the situation today. Rather, the point was to increase scholarly understandings of new research, ensure quick and cheap dissemination of knowledge amongst experts, and provide a system of communication that could sustain international communities of learning.

Scientific publishing is not free from commercial interests

By the twentieth century, the journal began to feel more urgently the pressure from the proliferation of scientific journals from commercial and university presses. The Society's various deliberations about the Transactions during this period reflect the delicate balance to be struck between the journal's (and the Society's) prestige and its commercial interests, particularly the difficulty of keeping a generalist journal competitive in an increasingly specialist market.

There were various attempts to maintain and extend the relatively new-found profitability of the *Philosophical Transactions*. A Royal Society Committee formed in 1973 to consider the Society's finances, and particularly the Society's publication activities, suggested that a strong appeal be sent to fellows for more papers to be submitted. In addition, the Committee considered that the number of free copies of papers to authors be reduced to fifty (from the previous 100 free copies) and the price of additional offprints purchased by authors be increased by at least 50%. In 1973, it was estimated that these reductions in offprint numbers would produce a saving of approximately £5,000! These changes are indicative of a new time in which journals had to make money.

This shift first took place in the commercial journals that were bought up by media magnates in the twentieth-century. Figures like Robert Maxwell brought in models of commercialism to a publishing culture that had previously not had to compete, fight to attract articles, nor make a profit. As the number of journals and publishing options ballooned in this century, even learned societies like the Royal Society had to grapple with competition, the cost of publishing each page and image, and the bottom line. Efforts like the one above were attempts to align the old journal with new capitalist business strategies, and ultimately succeeded in saving the journal. While never making much money, the Transactions nevertheless survived this period by adjusting yet again, including streamlining staff, creating more journals, developing a website, and hiring leaders with more commercial publishing experience. However, just as the old journal found its feet in the new commercial system, a backlash was brewing through the work of activists and publishing insiders who found the notion of making science profitable unethical.

For learned societies the expectations of Open Access are complex

By the 2010s, new attention to efficiencies enabled the journals both to publish research more quickly than they had done for decades, and to generate larger surpluses for the Society. The growing expectation of open access to research has brought new challenges and opportunities for Royal Society publishing. Today, the Society has diversified and expanded its portfolio of publications, and now produces ten research journals (two of which are open access), and a variety of occasional publications. The journal first went online in 1997, and the entire back issue archive to 1887 has been freely available since 2010.

The Society has tried a number of approaches to Open Access. It has launched two completely Open Access journals, and it offers both ‘green’ and ‘gold’ routes to Open Access on its other journals. In addition, it offers ‘delayed open access’, allowing papers in the physical sciences (series A) to be available freely twelve months after publication, and papers in the life sciences (series B) after twenty four months. After a major review of its publishing activities, the Society’s Council agreed in July 2020 to transition the existing (hybrid) research journals to Open Access within the next five years. By mid-

2021, over half the articles published by the Society were already OA.

Flipping all its journals to Open Access will have significant long-term effects on the Society's finances, and it is not currently clear how the Society (nor other learned societies) will balance the demands of differing elements of its scholarly mission. It is worth noting, however, that reaching a broad audience has preoccupied the minds of those coordinating the Royal Society's publication for decades before the contemporary and rather more public discussion of access to research.

Taking stock – Learned societies in action

How does anything survive for 300 plus years, let alone a scientific journal of limited interest to non-scientists? The key to the *Transactions*' success (although the definition of success has varied greatly over the centuries) is its flexibility and focus on survival. This has meant making hard decisions, changing course, admitting defeat, folding projects, making a loss, and rearranging fundamental values. No doubt, the focus on its survival is what has saved the project, alongside the work of editors, printing staff, authors, peer reviewers, secretaries, administrators and champions from science and the Society. In our project and in our new book, we have tried to show how the object at the heart of our story – a scientific journal – is connected to the lives and work of countless individuals, networks, workers, technologies, cultures, and trends. This centuries long story points to the need for learned societies to adapt and learn in the face of current challenges, something their predecessors working on the Philosophical Transactions would know well.

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