WHY JOURNALS ARE PUBLISHED: THE AUTHOR, THE EDITOR AND THE REVIEW PROCESS

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Paper presented at a one-day seminar entitled The Journal at the Crossroads, London, 22 September 1993

It is often said that there are too many journals, that most of the papers published in them are never read, and that libraries cannot cope with the flood. The last point may be true, but the two earlier ones are very much open to question. Accordingly, the present paper looks at journal publication from the point of view of the author and editor. Why are journals published? Why do authors and editors expend so much time and effort upon manuscripts that, allegedly, few may read? As an erstwhile author, editor and publisher of papers in biomedical science I hope to clarify these matters a little, at least as far as concerns academic journals containing new ideas, new concepts and the results of much laborious research.

Why are there so many journals? And why are publishers so keen to add to the list? The mainspring of the process is to be found among the academics themselves, for publishers foster, but do not usually initiate the drive.

Like everyone else, academics want value for money and prefer to subscribe (or get libraries to subscribe) to journals that meet their needs most of the time, rather than journals that occasionally contain material of interest. For scientists, research journals are overwhelmingly the most effective way of satisfying their information needs (Anonymous, 1992)[1], with a clear majority (67%) preferring specialist journals. Indeed, that is why a number of major general journals in broad subject areas, like chemistry, physics, or physiology, have been sectionalized, so that a scientist, laboratory, or library need only buy a section of particular interest, and not bear the expense of the complete serial. Major general journals have often suffered from impact of competing specialist journals and in this way are fighting back.

Generally, a new journal is launched because a new field is poorly covered by existing journals, or there is a feeling that a subject has developed, or is developing, to such a degree that growth would be fostered by having a journal of its own, as I have observed on a number of occasions in my own subject area. If the presumptions of the editorial board and editors are correct, then the journal will attract readers and grow. If not, it dies.

There are several reasons for the endless flow of research papers. One is, naturally, to report the observations made in the course of a study and the conclusions drawn from them. Without such a report, made widely available through journal publication, the research might just as well never have been done, the knowledge gained lost to succeeding generations and the investment entirely wasted. This is not a trivial matter, for if the amount of money spent on research is divided by the number of publications describing the findings then it emerges that the research investment per paper is about £33,000 in the USA and from £8-15,000 in the UK (Griffiths, 1993)[2]. In many cases, another reason for publication is to support applications for research money. Grant-giving bodies are naturally reluctant to continue to support research workers who fail to get results, and the publication of papers helps to establish that the research grant has been well spent. Also, grant-giving bodies like to see their generosity noted in the acknowledgements at the end of the text, for that helps to show the public where their donations have gone.

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Academics also publish papers as a means of career advancement. Although sometimes derided, the evaluation of a bibliography or list of publications remains a perfectly valid means of assessing the ability and achievements of an individual, for just as the publication of a good paper is regarded with favour by peers, so the appearance of a poor paper has the opposite effect. Neither the length of a paper nor the number of papers is particularly important in the academic world. Quality is all. I know authors of hundreds of papers who are poorly regarded by their peers, because their work is regarded as repetitive and pedestrian. I also know others who have published relatively little, but whose works are valued highly because each paper has advanced their subject considerably. After all, an outsider is unlikely to accurately assess abstruse research findings, whereas the expert is expected to distinguish between the good and the bad.

We explored the reasons given by scientists for the publication of research papers in a recently completed study of the STM information system (Coles, 1993)[3], and the primary motivation reported by well over 50% of those interviewed was, simply, information dissemination. The next reason given (by about 20%) was to improve career prospects, and the third (about 12%) was to improve funding. Egotism accounted for about 8% of responses.

Peers are quick to detect, and deplore, repetitive publication. When I was busy as an editor, my referees often pointed out that the observations reported in a manuscript submitted for publication had already been reported elsewhere, so precluding publication in our primary journal. For scientists, like librarians, hate repetitive publication.

The message thus far is that the quality of a paper is paramount, despite the opinions of the naive. In the STM study, when scientists were asked how they selected a journal for the publication of their work more that 40% cited its prestige and over 25% were concerned with the degree of specialization of the journal. About 12% were influenced by the fact that the journal had earlier published one of their papers. Other factors, such as whether the editor was personally known to the writer, whether colleagues published in the same journal, whether the journal was published by a favoured learned society, and the time lapse between submission of the paper and publication, were of minor significance, being mentioned by less than 5% of respondents.

Contrary to the uninformed view, it is not easy to publish a paper in a first-rate journal. Authors are expected to submit several copies of their work, so that two or more referees (chosen for their expertise in the topic) can be sent a copy. The reports of the referees are then generally reviewed by a member of the editorial board (again with specialist knowledge) before a recommendation is made to the chief editor concerning its suitability for publication. If publication is favoured, then the paper goes to a press editor for further scrutiny, or, in case of rejection, a report based upon or including the comments of the referees is prepared and sent to the authors. Very often, the decision is that the paper can be accepted provided that a satisfactory response is made to a series of criticisms, which may include demands for further work.

Many journals reject more than fifty per cent of the manuscripts submitted; some reject even more. Almost always, the referee is asked specifically whether there is enough original material in the paper to warrant publication, whether there are any faults in the logic of the arguments presented, whether there are any errors in the mathematics, calculations and statistics, whether the layout of the paper is logical, whether there are any sections that should be expanded or (preferentially) condensed, whether the title and abstract are appropriate and correct, whether the figures and tables are satisfactory and correctly labelled, and whether the references are correct. As I know to my cost, refereeing is time-consuming. It can take several hours to referee a paper properly, and that is usually time spent outside the normal working period. Referees are seldom paid, but perform this vital service as part of their duties as a member of the research community, and because they want their own work to be similarly critically screened. While an appointment as a referee entails hard work, it is also cherished as a mark of esteem. That is why editors often print a annual list of persons used as referees. Not only is this a means of thanking them, but it also tells the world that their opinion is valued.

No editor wishes to print redundant material or information, for all journals have space

limitations. The subscription price generally allows for the publication of a certain number of pages: print more and the journal is on the way to making a loss, print less and the subscriber complains bitterly. Accordingly, the high rate of submission to reputable journals inevitably means that editors look for ways of squeezing more papers into the pages available and naturally press referees for advice on trimming surplus material.

The refereeing process is remarkably objective, for here the reputation of the author counts for little, since each manuscript is evaluated independently and without regard to previous publications. The anonymity of referees favours frank expression, and it is quite usual for the work of the eminent to be criticized and rejected by their up and coming brethren, sometimes quite validly. Judgement is required on the part of the editor in mediating, and sometimes fostering, productive discussion. There are occasions when the system is abused, and when the referee exercises prejudice rather than judgment, but these are quickly identified by a good editor. Such referees are soon discarded.

Disappointed authors are free to submit their rejected paper to another journal, and generally take this opportunity to polish their work on the basis of the comments of the original referees. Sometimes they can come unstuck, for the second journal may send the paper to a referee previously approached to review the first edition. Editors try to avoid this circumstance, for the sensitive or self-centred author then sometimes complains of persecution.

While it is often said that an outlet can be found for every paper, or that nothing need remain unpublished, reality argues otherwise. It is a foolish author that persists in trying to get a paper published after several rejections by reputable journals. Inevitably, resort has then to be made to less well-regarded publications, where the cynical reader naturally assumes that the paper must be second-rate. In our STM study, we were surprised to find that about 20% of respondents in higher education claimed that they had never had a paper rejected, while nearly 40% of those in industry had been treated likewise. About a third of those who had had their papers turned away revised the work and submitted it elsewhere, but most did not persist beyond the third rejection.

Besides being time-consuming, refereeing is expensive. Much money is spent by journals on the administration of a refereeing system, and in paying for the postage, packing and the preparation of reports to authors, with manuscripts passing back and forth between the authors, editors and referees many times. And with half of the papers submitted to a good journal being rejected, much of this effort is fruitless.

Since refereeing is expensive, and seemingly wasteful, why is this investment made? What favours the preservation of the refereeing system? The answer lies in quality control and reputation. Academics pay attention to the composition of the editorial boards of journals, and disdain journals that publish unrefereed papers. This means that peer review is essential for economic viability and continued purchase of the journal by libraries. Without peer review or refereeing an editor can indulge preferences and prejudices with little restraint - which may be good for a journal of current affairs and opinion, but not for a journal of record.

One curious consequence of the refereeing process is that it can be very hard to block the publication of a reasonably well done piece of work, regardless of how dull it appears to be. For if two referees recommend publication, then the editor can seldom hold the work back, though it need not be hurried into print. The conclusions of the referees can be questioned by the editor, and the advice of others sought in cases of dispute, but, in the absence of good reason, the editor must give way. In other words, the editor has relatively little control over the content of an academic journal, though great influence over the reliability and quality of the material published. And a good academic editor strives to attract high quality material, for publication of poor material opens up a highway to oblivion.

Further, it is very difficult for an editor to reject a paper just because it is not very interesting. Provided that the paper meets the customary standards for that journal, then publication follows. The editor cannot argue against publication on the basis that only a few readers will make use of the work: if the work falls within the scope of the journal then it gets

published. Many times have I looked at papers recommended for publication by my referees and felt that they advanced knowledge of endocrinology or the physiology of reproduction only marginally. But they did add a bit, for the referees said so, and experience has shown that papers neglected at the time of publication often turn out to be classics later, once the significance of the observation is realised.

The acceptance of a paper for publication does not mean that it is regarded as perfect and can immediately be sent to press. While the referees and editor may have indicated where improvement is needed, careful and detailed work is still required to check that the observational values in the text match those said to be found in the tables, and that all of the tables and figures mentioned are to be found in the manuscript. The references need to be checked for accuracy and related to the text, and the text itself read for clarity, amongst much else. Authors are fallible and make poor critics of their own work, so that the paper that cannot be improved by careful editing is rare indeed. Further, authors rarely follow the advice given in the 'Instructions to Authors' and so generate additional work for the editor. It is generally quicker for the editorial office to make the changes required in a submitted manuscript than reiterate the requirements and demand that the author makes the appropriate changes.

Having described the steps taken to select and polish high quality papers for journal publication, and indicated why this effort is necessary, I do not go further and claim that the system is perfect and incapable of improvement: only that journal editors and their publishers accept that the labour is essential. Why else would they strive so hard for excellence and precision? Perhaps the virtues of the present system emerge more clearly when alternative modes of publication are considered. Take the Swinnerton-Dyer proposals, for example. In a recent issue of *Serials*, Sir Peter Swinnerton-Dyer (1992)[4] argued that a family of electronic journals be set up in the United Kingdom under the aegis of the Royal Society and using the JANET network to replace conventional journal publication. In his eyes there would be economic advantages in bypassing the cost of setting up articles in print and from no longer having to print a thousand copies of a journal in which, he claims, a typical article has fewer than a dozen readers. There would also be editorial economies because articles in a database would not need the consistent style of printed articles. Although it is accepted that the cost of maintaining the database would need to be shared, alongside some of the costs of the network, Swinnerton-Dyer points to the low cost of the experimental electronic journal *Current Clinical Trials*, as a fore-runner of future developments.

This idea has its attractions, experimental work designed to assess its practicality is under way, and the HEFCE is currently assessing the feasibility of mounting electronic journals on SuperJANET. But the electronic journal does not provide a simple solution to present-day problems. Thus, it is presumed that publishers contribute little of value to the information system. This must be wrong, for if this were true they would have been squeezed out of the market long ago. Major scholarly societies operate substantial publishing operations for the benefit of their members and for their subject. These activities are supported because the appropriate governing bodies are satisfied of the importance of the work.

Further, the adverse effects of electronic publication upon the life of learned societies are ignored. For many, the identity and the value of a learned society is assessed through its publications. How would this be sustained if the papers produced by its members were simply fed into an electronic network, to vanish from sight? How would referees be motivated to act conscientiously when the results of their work only emerged as part of the memory store in a database? People take pride in working for and contributing to a highly-regarded journal, and it is hard to see this sentiment being derived from items in a network. Further, many societies depend upon the revenue from its publications to subsidize other activities, and it is unlikely that increased membership subscriptions could replace this source of funds.

It is also noteworthy that while 60% of all respondents in the STM survey were prepared to submit papers to a peer-reviewed electronic journal, 30% were concerned that such publications might not be acknowledged in career appraisal. This view is backed by experience with the model electronic journal, *Current Clinical*

Trials, which has been shown to attract subscribers, but has little appeal for authors. The number of manuscripts submitted for publication is far below expectation, probably because authors regard the electronic medium as evanescent and of limited value in bibliographies and in prestige terms. Because of this factor, summaries of the material appearing in *Current Clinical Trials* are being published in hard copy form in *The Lancet*.

Next, the editorial economies envisaged by Swinnerton-Dyer are underestimated. As I have pointed out, every first-class journal invests heavily in the editing of acceptable papers, which are checked in detail for accuracy and clarity and often rewritten in part. This work is expensive and would not be undertaken if it could be dispensed with. To pour poorly edited papers into an electronic network would be to overwhelm the system with dross. If good editing is undertaken, then the costs must be recovered when papers are retrieved from the electronic system.

While the introduction of a system of electronic publication could be advantageous to those users with ready access to terminals and print-out facilities, the loss of the equivalent print-on-paper publication could be disastrous for those lacking these benefits. Print-on-paper information can be spread through the community by means of the postal system in a fashion that facilitates browsing, and can be stored on shelves in a systematized fashion, with tables of contents and indexes provided routinely. For this reason, a print-on-paper version of an electronic journal would probably be needed for readers lacking access to the network, as well as those in the less developed countries. Immediately, the presumptive savings from the avoidance of composition and printing costs would disappear.

It must also be pointed out that considerable investment would be needed in the administration of a centralized electronic journal system. Each paper must be properly labelled and indexed in order to ensure retrieval, and some current awareness system set up to advise users of the existence of papers as they are added to the system. A large staff would be needed to exercise these functions.

The capacity of the network required to handle the vast traffic likely to be generated needs careful consideration. Although new technologies are likely to remove bottlenecks, the costs of the management of the system and for the levying of charges are likely to be high. And since the use of scholarly journals is not confined to the university or academic sector, commerce, industry and all other sectors of society must be given access to the network.

The archival problems of such a central system also require attention. How is the database to be made permanent for the use of succeeding generations? The content of print-on-paper journals can be stored indefinitely, whereas the life of an electronic archive is limited, partly by the obsolescence produced by technical progress and partly because there is no national archiving mechanism. Yet permanent storage is essential.

All in all, there is a an unrealistic presumption that the day of the conventional journal is done. At present, the technical problems in transmitting and reproducing high-quality images and colour through an electronic network economically remain to be solved. This feat can be achieved, but at high cost. Likewise, the advantages of the print-on-paper journal are such that few of the large circulation periodicals are under serious threat, although their publishers are considering the opportunities and perils of electronic publication very seriously. Experiments involving learned society and commercial organizations are in hand, and considerable efforts are being made to resolve difficult problems relating to copyright, payment, and access to the system. Evolution has begun, and should not be interrupted by a major upheaval.

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