

SOME THOUGHTS ON SCIENTIFIC JOURNALS IN INDIA

by

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1. Introduction:

I deem it an honour that I have been invited to deliver the keynote address at this conference of professional editors and information scientists.

During the last seven years, I have been associated with the journals published by the Indian Academy of Sciences and with Current Science.

Because of this I have been continually in touch with scientists, authors, editors, referees, printers, compositors, editorial and office staff. I have also received several hundred letters - some laudatory and some critical - on topics such as the quality of refereeing, the promptness (or the lack of it) in bringing out the journals, mistakes in printing, the quality of production, my own abilities as editor, etc.. I have learnt a great deal from this experience. In this talk I shall share some of my thoughts on this subject with you.

To any one who surveys the quality of scientific publications produced in the country, the position would certainly appear to be bleak. This need not lead to total pessimism - as there are still a few journals in India which must be considered good by any standard of assessment. The question therefore, is not whether we can produce a good scientific journal in India but what is it that has made the vast majority of them so bad.

One answer to this could be that the science we produce in the country is not good. For the quality of our scientific journals is directly related to the quality of the science we produce. While it

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is true that the quality of our science is by no means of the highest order, our journals are much worse than the science we produce.

It is not my intention to deal with statistics today. I find that during this conference many speakers will produce a great deal of statistics. I must, however, sound a note of caution to you not to get too involved with the fashionable number game that is now played for analysing the quality of science by the techniques that are mainly applicable to 'big science' which is pouring out of the West. Such an exercise may retard or even harm the progress of science and technology in India.

I believe strongly that our present predicament is closely linked with the behavioural patterns and the motivations of our scientists, those of the younger scientists who are the main source for our scientific publications and of the older ones who rule the roost.

2. The earlier Indian Journals and their methods

Scientific publications started in India in earnest at the beginning of this century. The twenties and the thirties were a glorious and exciting period in the history of Indian science. It was the only period when Indian science made a definite impact on the rest of the world. It was the period of such men like J.C. Bose, Ramanujam, Raman, S.N. Bose, Meghnad Saha and Birbal Sahni. These scientists were extreme individualists. They were also ardent nationalists. Consciously or otherwise, they took upon themselves the task of proving to the world that India was a land of intellectual creativity. They did this rather well as they succeeded in putting India on the map of world science. The pattern they set as far as scientific publications went was the following:

- (a) They established scientific journals in India which appeared punctually and which ensured prompt publication.
- (b) They were mainly worried about the quality of science published in the journals and not so much with the texture of the paper or the quality of the printing.

- (c) They published their scientific papers in their own journals to establish priority.
- (d) They invariably sent short communications to reputed scientific journals abroad to achieve the required publicity.
- (e) The quality of the work and the references made in foreign journals to Indian ones gave to the latter a standing and a reputation so good that most scientific laboratories in the world subscribed to journals like the Indian Journal of Physics, the Proceedings of the Indian Academy of Sciences, Current Science or Sankhya.

As an example of the last point, I might mention that immediately after the publication of the classical papers by Raman and Nath on the theory of Diffraction of Light by Ultrasonic Waves, the circulation of the Proceedings shot up considerably.

3. The decay of Indian Scientific journals

The direction of science in India took a new turn in the years following the war and national independence. It was during this period, that the structure of scientific activity in India altered beyond recognition. It was then that vast investments were made in the name of science in India. It was felt that research in pure science, even if prestigious, would do little to solve the myriad problems faced by a nation like ours. It was, therefore, decided to start intense activity in applied science and steps were accordingly taken.

One consequence of this was that large numbers of very young students were sent abroad to get scientific training. This investment in applied science ushered in the era of imitative technology which was considered by many to be essential for growth of an under-developed or developing country. This did possibly help the country to grow industrially. In any case, it must be noted that very few innovations or inventions were made in the fields of applied sciences and technology and even these made no impression whatsoever on the rest of the world.

In recent years there has been a tremendous interest in the application of science to rural problems. This is to the good and it is what Gandhi wished for and propagated. It must however be recognised that very

few new ideas have been generated indigenously. Many so-called developments, even in this field, are based on ideas created elsewhere. This by itself may not sound alarming but it can have very dangerous overtones. In fact one gets rather worried about why Western countries are so keen on our rural technology. But we shall not discuss this vital issue today.

It may be argued that the purpose of encouraging the applications of science, be it to rural areas or for the country as a whole, is not so much to promote originality as to ameliorate the living conditions of the people. Even so, it is a bad commentary that in spite of so much investment and promotion very few original ideas have come forth.

Let us now turn to the effect this commitment to applied science has had on pure science and on scientific publications. As I said before, a large number of young scientists were sent abroad to get trained. When they came back, they followed the patterns and trod the paths laid down by their Ph.D. supervisors in the West. While they did carry out genuine research, they were by no means pace-setters; they were not creators of new movements as our earlier scientists were, but, rather, the followers of fashions set in other places. Not surprisingly, they much preferred to publish in the scientific journals of the West where their work naturally found its place. It is the Indian scientists who blaze new trails who really need their own journals to guarantee the priority and recognition that quick publication will provide.

There were also other rather disconcerting effects. Those who succeeded in this imitative technology were naturally placed in positions of power, both within organisations and on the national scene. Whatever their usefulness in other ways, their judgement and assessment of originality or creativity were, understandably, not of the highest order.

The era of imitative applied science induced much imitation in pure science as well, with very similar effects. All this had a deleterious effect on Indian scientific journals. There can be no doubt that, except in a few cases, the quality of Indian journals has deteriorated since independence, reaching an all time low in the late 1960's and the early 1970's.

Over these years the number of scientific journals increased steadily but their quality was mediocre or worse.

4. The Motivations for publishing

Why would a young scientist in India like to publish his scientific work?

- a) The immediate concern of any young scientist brought up in the tradition of modern science is to get priority and credit for an idea that he has generated.
- b) He would like to get a fair assessment of his work by his peers, get recognition and a reputation amongst his scientific contemporaries.
- c) He would like to obtain professional advancement.

Let us examine the state of affairs that exists in relation to these motivations.

Most Indian journals are not punctual, and there is a considerable delay (sometimes of years!) between the acceptance of a paper and its publication negating all the basic concepts of priority.

A scientist has a greater chance of recognition in the world of science if he publishes in a scientific journal outside India. The standards of assessment in many foreign journals are superior to ours. And so, a scientist gets a much better assessment of his work if he sends his work to a foreign journal. Because of the vestigial state of our peer system of assessment, a good scientist usually gets recognition in India only after he gains a reputation abroad. One can therefore understand the motivation of a young scientist to get peer recognition first abroad by publishing there.

Finally, the professional advancement of a scientist in India can be obtained by processes other than by doing good science or by publishing good quality scientific papers!

One could, of course, take the stand that these personal motivations of our young scientists are based on false premises. But I feel that it would be difficult to change these attitudes even if they are wrong. The experience in many countries including China supports this.

5. The Course of action

One drastic suggestion to alter the situation is to have a dictum compelling all Indians to publish only in Indian journals. I discussed this proposition with some of my younger colleagues - who are creative scientists. While they were not very much in favour of such a dictum, one said that this may have a salutary effect if all scientists in high and low positions were to publish in India. Said he "If the transport commissioner has to travel by bus there is some chance of the bus service improving". Added another with a twinkle in his eye "provided the transport commissioner has to travel at all" (implying of course our "leaders" of science may not have any serious requirement or compulsion to do science or to publish scientific papers). The idea of compulsion is abhorrent to my way of thinking.

I feel that it is futile to preach to the younger scientists to publish in India without doing something positive about our journals. From my association with them, I can say that they are usually reasonable and full of enthusiasm for new ideas. They would be most willing to participate in any progressive move provided they are sure that they are not being led up the garden path.

The only course of action that seems to be open to us, is to make a serious effort to improve our scientific publications. The steps suggested are:

- (a) To have extended discussions with the younger and more creative scientists in a particular field to assess the requirement for a journal in that field and get the collective support for it from these scientists.
- (b) To ensure that only papers of the highest quality are published in the journals by using the scientific community itself to co-operate in the refereeing and editing process.
- (c) To organise the journal so that it appears punctually
- (d) To decrease the time lag between the submission of a paper and its publication.

- e) to be certain that the contents of journals get into the current awareness, abstracting and indexing journals.
- f) To improve the quality of printing, the paper and production.

6. Refereeing

The only method of improving the quality of scientific papers in a journal is by insisting on the highest standards of refereeing. In fact, a good journal disciplines a scientific community by demanding an impartial assessment system based only on quality - not dependent on any hierarchical system.

"Relegating the refereeing of our best scientific work leads to the loss of judgement and self-confidence", we said in our first editorial in Pramana.

My early experience indicated that the referees' comments in India were, more often than not, wishy-washy. We can see this most clearly when the reports of Indian examiners for Ph.D. theses are compared with those from outside India. The general attitude is one of not hurting anyone, of not committing oneself - as though there is some fear that the author may somehow come to know of the criticism and resent or dislike the referees personally. It is my experience that once the scientists realise the tremendous responsibility that has been put on them, they do their job efficiently. This does not mean that our referees give fair criticisms. I can now state that more than 60% of the referees with whom I deal with are balanced and critical and they would compare favourably with any in the world. However, some are really bad and do not read the paper carefully, or at all, and make very general comments which are often pompous or platitudinous. Fortunately, it is quite easy to spot this latter kind and to remove them from the list of referees. An editorial office must continuously change its referees' list. A grave error is to overload the referees - particularly those who are willing to work. A simple card index with the name of the referee, the subject of his specialisation, the papers he has refereed, the time he has taken in each case along with some confidential comments by the editor proves an useful aid to keep track of the work that the referees do.

There has been a lot of discussion on the code of practice for scientific journals (Royal Society Report, Nature, Nov. 6, 1975 and Nov. 27, 1975). I personally believe, in spite of all that is said against refereeing and about stray incidents in which some outstanding paper has been refereed out, that the best method of improving the quality of science in a journal and to get the scientific community involved in a journal, is to develop and insist on a strict refereeing system.

The open refereeing system is another question we should look into. The author of a paper would very much like to know the name of the referee who accepts or rejects his paper. The proponents of this concept are mainly motivated by the feeling that nothing should be done surreptitiously. I believe that the open refereeing system will not work in India. Firstly, our society is still hierarchial (in spite of our vociferous denials) and our younger scientists who are our best referees may be quite unwilling to accept the open refereeing system. The more serious objection is that a conscientious scientist, while quite willing to give his time for refereeing, may not wish to waste his time in personal controversies. Even outside India, the general consensus at present is against the open refereeing system.

7. The Editorial Board and the Editor

The members of the Editorial Board are supposed to be the real watch-dogs responsible for the quality of papers that appear in a journal. They have also to point out to the editor whenever a bad paper gets past the referees into the journal. In the Indian Academy journals, we use them when there is a difference of opinion between two or more referees (and this happens quite often). Unfortunately, the long list of the editorial board members generally plays only an ornamental role, announcing to the world the "moral" support that a journal gets from many scientific groups and to give evidence that it is not issued by one geographical group!

I feel that it is best to run a journal with three active editors and a large editorial advisory board who can hold a watching brief for the maintenance of quality.

About the Chief Editor of a journal there are two views. One view is that the editor should be a respected member of the scientific community with a standing in his own field of science. Another is that a journal requires an editor with a professional training who is a good organiser and administrator and it would be even preferable if he is not a scientist. Each has its own advantages.

I subscribe to the former view - for, I feel, that the quality of a journal and its prestige is determined by the direction the editor gives it. I did praise and pitch strongly for the refereeing process for building up the peer-assessment system so essential for a scientific community. However, one must be aware of its pitfalls and not be carried away. Revolutionary ideas may not get past referees for the very reason that they are meticulous. Sometimes they do not see the wood for the trees. An editor with a broad based view of science may have to overrule referees' decisions, to get new unconventional ideas published (sometimes even if they are using these to provoke thought amongst the scientific community). The reputations of many journals have been built on such decisions by their enlightened editors.

The second view also has many supporters and many points in its favour. A young scientist summarised this by saying that by having a professional editor the journal would lose character but may gain efficiency. The pros and cons are similar to the problem as to whether the Director of a scientific laboratory should be (a) a practising scientist or (b) an ex-scientist doing only administration or (c) a professionally well-trained administrator.

8. The Editorial Office

We are told often that India has 300 journals. I am therefore certain that we have different types of editorial offices. A study of these would, in my opinion, be worthwhile. There is, I understand, one office with more than 100 members of staff running about a dozen monthly journals while there is another with 8 individuals running what is equivalent to 6 monthlies, succeeding in bringing them out regularly.

I personally prefer a small office of motivated persons who are personally and professionally devoted to its journals. A small group permits a personal relationship to exist between the editor and his staff. He will not be overburdened with the problems of "administering" his staff. He can easily keep their technical and financial advancement in mind. What is often forgotten is that considerable initiative is often necessary on the part of the office staff if the journal is to maintain the highest standards. Any slackening on their part immediately reduces the quality of the journal. To promote initiative one has to reduce drudgery. The secret is really to see which processes are routine, separate them out and systematise their operation. This is very easily done by the office having a flow chart for each paper submitted for publication. Check lists must be carefully prepared for all the operations like initial correspondence, refereeing, copy-editing, proof-reading, page making, reprint requirements, etc. I shall not mention the importance of providing such aids as franking machines, addressographs, calculators, etc. for the office. By removing drudgery, one not only increases the efficiency but allows the staff to look into matters where initiative is important.

9. Printing of Journals

The printing presses have contributed greatly to the disrepute of many Indian scientific publications. All printing presses - the prestigious ones with foreign collaboration, those run by large industrial houses, governmental printing presses, centralised presses run by autonomous bodies are all in the same boat as far as scientific journals go. They have all failed us miserably. One has to make a detailed study of printing presses and their operations to know why the situation is so bad.

The basic causes are not far to seek. The printing of soap wrapping paper, prospectuses or even drama notices is more paying than printing scientific journals. Printing presses are generally overloaded with work and they invariably undertake work much beyond their rated capacity. The salaries of compositors, printers and proof readers are generally too low for the careful work expected of them by scientific journals.

What is the type of printing we should go in for - Letter press, photo-offset or photo composition?

The relative merits of photo-offset and letter press are of particular relevance to us in India. The American experience is in favour of photo-off set. Western sources say that the photo-offset becomes competitive to letter press only when the number of copies exceeds 5000. Unfortunately, no proper study of this has been made under Indian conditions. I have a feeling that in India photo-offset may be able to compete with letter press even when the number of copies to be printed is 1000. But photo-offset printing carries with it many problems such as electric typewriters, composition of mathematics, justification, the quality of paper, photo-gravure reproduction, etc.

Photo(computer) composition appears to be the ideal answer to most of our problems. But one must be rather cautious in making this choice as the technology of maintenance is rather difficult. Most companies selling these machines promise maintenance but have neither the facilities nor the knowledge for this. These instruments require a fair knowledge of computer programming and their maintenance requires an experience in sophisticated electronics. It may therefore be advantageous to attach or locate them near larger scientific institutions where these disciplines form a part of their normal activity.

Many solutions have been suggested to overcome the printing problems of scientific journals. One is that India must have a centralised facility for printing all its scientific journals. I am personally averse to this idea. This may possibly work in other countries but never in India. A centralised facility is of course very efficient - on paper, but it does not work in practice. Something usually goes wrong. In which case all journals, good or bad, will suffer. Another suggested solution is that a journal should acquire its own printing facility. Should a journal take on all the headaches of the printing industry, its labour problems, the instrument maintenance problems, etc? In taking these decisions, we must keep in mind the fact that our main purpose is to bring out journals with high quality science.

10. New Directions

I shall again ask the question as to what constitutes a good scientific journal? In recent years I have visited many centres of learning in the West - Cambridge, Oxford and York in England; Grenoble and Paris in France; Harvard and Caltech in the United States. One could not but be struck by the excitement in the air. There is an intellectual ferment. The arrival of a journal like The Physical Review Letters or The Astrophysical Journal is an event. On that day the work reported in these journals is discussed in coffee rooms, cafeterias and beer parlours. This type of excitement in scientific work and interest in journals is singularly lacking in our laboratories, research institutes and Universities. How is one to produce this excitement in our journals? Our journals can be exciting only if the science they contain is exciting. The advice that Lewis Carroll gives about speaking seems eminently applicable to our journals "Take care of the sense, the sounds will take care of themselves." The question is really therefore reduced to "Can our journals help produce an intellectual ferment so that the highest quality of science is produced in the country?" This can be done only if the culture of science is made to percolate deeply into the community. Only then can this metamorphosis take place. Can we help to revive our dying universities? Can we help our bright young students to perceive the excitement of creative science?

In fact, every editor has to ask himself as what readership his journal addresses itself to. Are our journals only to be of archival interest where scientific and technical information is interred or buried for posterity or are they to be alive - a means of promoting science in our country? I feel we have to reach out to our university students and research workers and inspire them. If so, we should consider carefully what some of our journals should do. We must be cautious and not just "popularise" science. Popularisation of science is of course necessary for cultural reasons and is a must in a democracy. But, superficial popularisation may not lead to a deeper understanding and deeper appreciation of science which alone can lead to creativity in science.

One may have to describe and discuss some recent scientific discoveries made in different centres of the world in such a manner that their essence can be grasped. One may have to publish review articles. These must have a different structure from the usual ones. The first part must enunciate in simple language the basic principles and expound the foundations on which the subject rests. The later parts must of course discuss the latest developments. The journal must contain original research articles, so that the young reader may get the excitement of reading scientific work "fresh from the oven". There may even be separate annotations explaining the contents and significance of these original papers. These ideas may appear blasphemous to those having conventional ideas about scientific journals. But problems in India are different and difficult. We must evolve our own methods of tackling them. Or else we would just be following like sheep, patterns evolved in the West for its own advancement - patterns which may be quite irrelevant to us.

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