



President's column

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Journal Ranking and ERA

The issue of journal ranking is the main one exercising everyone's minds at present. It is such a large and serious issue that it almost eliminates all others from contention. However, a related matter is the Australian Research Council's (ARC) misallocation of mathematical physics to physics, rather than mathematics, among the clusters it established in the run-up to ERA (Excellence in Research for Australia). We have protested about this, and have received the following response from the ARC:

Thank you for your suggestion regarding the placement of "Mathematical Physics" within the Physical Sciences cluster. You are correct that this is not in accordance with the ANZSRC. The ARC will take this into account when consolidating feedback.

Although I'm not one to declare confidence in the ARC doing the right thing (they usually try all the other options first), I'm optimistic that they will see the light in the matter of mathematical physics.

However, the journal ranking issue is more of a challenge. The problems we are facing seem to be caused primarily by two aspects of the ARC's methodology:

- (i) a substantial reduction in the total number of journals that the ARC will allow us to rank (they have correspondingly reduced the number of journals we can place into bands A* and A); and
- (ii) the use of impact factors to rank journals in applied mathematics and statistics, and perhaps also mathematical physics.

So that we can be clear what is what, I should mention here that the previous journal ranking was undertaken by the National Committee for the Mathematical Sciences (NCMS), whereas the current ranking was prepared by the ARC. It's with the ARC list that we presently have serious problems.

Regarding the number of research outlets that the ARC is currently willing to regard as mathematical science journals, let me try to give you a sense of the scale of the changes that the ARC has made. According to my calculations, the ARC list of ranked journals allocates 538 journals to pure mathematics, 211 journals to applied mathematics, 28 journals to mathematical physics, and 169 journals to statistics (including probability), making a total of 946 journals for the mathematical sciences. However, the list produced by the NCMS allocated a total of 1369 journals to the mathematical sciences. That is 45% more than the ARC list. On this basis, and making some assumptions about uniformity of distribution

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among the four research areas, we should expect the ARC's list to contain only two-thirds the number of journals in tiers A*, A and B as the NCMS list.

Indeed, both the ARC and NCMS lists are restricted to having 5% of journals in tier A* and 15% in tier A, so by reducing the total number of journals we are forced to have fewer journals in the A* and A categories. I should mention too that there are a number of other inaccuracies in the ARC's allocation of journals to areas. To give just a few examples, a journal in statistical mechanics is erroneously included under statistics, a statistics journal has been mistakenly allocated to applied mathematics, and some journals have been given very unexpected rankings by the ARC.

A large number of journals have disappeared entirely from the NCMS list, appearing nowhere on the ARC list. (In my field, the journals *Bioinformatics* and *Biostatistics* are extraordinary omissions.) One reason for this (although not one that applies in the above two cases) may be that some of the ARC's advisors have an aversion to journals that are not covered by the on-line citation index, the Web of Science (usually accessed through the Web of Knowledge). Another major reason for the reduction in the number of journals on the ARC list has been the ARC's resistance to listing, in two or more different categories (or, equivalently, against two or more four-digit field-of-research codes), the journals where mathematicians publish. For example, a journal where mathematicians publish their work in mathematical biology, and which is classified as a biological sciences journal, might be ranked lowly by biologists but highly by mathematicians, but will have to keep the low ranking as far as mathematics is concerned. In the NCMS list a journal could be ranked differently by the two groups.

We have let the ARC know that we are unhappy with this. Apart from reducing the number of journals we can have, and therefore also the number of journals we can have in the A* and A categories, the disallowance of dual rankings strongly inhibits multidisciplinary work in the mathematical sciences. In response, the ARC stated that one of the concerns guiding their development of the new ranking was that, in the case of the NCMS list, 'it was found that the mathematics listing was far too broad, and included hundreds of journals that were not core to mathematics'.

Additionally, the Australian Academy of Science has told me by email that the ARC had expressed to them the following concerns about the original list: 'The sub-discipline lists were lumped into one list and a large number of journals core to other disciplines were added'. The first of these complaints means that the NCMS list didn't draw divisions among pure maths, applied maths, mathematical physics and statistics. That problem could have been fixed very easily. The second complaint is the one I mentioned earlier — that journals that are 'not core to mathematics' were included by the NCMS in their list.

Nevertheless, in some pairs of fields distinguished by four-digit FoR codes, although seldom in mathematics, journals were given dual rankings in the ARC list. We have invoked that precedent to try to persuade the ARC to allow dual rankings for journals that we regarded as of fundamental importance to mathematics and statistics, but which are also claimed by other areas. More generally, we have argued that mathematics and statistics, uniquely among the sciences, cut across

many discipline areas in science and social science. The fact that mathematicians and statisticians publish in many non-mathematics journals should be seen as a strength, not a weakness, especially in an age where first-rate work in science and technology is increasingly multidisciplinary. Therefore dual ranking should be encouraged.

The ARC's use of citation-based journal-ranking methodology is also of serious concern. According to the ARC, the pure mathematics list was prepared with outside assistance. However, it seems clear that the applied mathematics and statistics/probability lists were prepared largely from citation data, and that no experts in those fields were consulted directly by the ARC. An email message sent to me from the ARC in June mentioned that 'citation data was used to derive the applied mathematics and statistics journal rankings'.

The ARC knows that we have previously protested the use of impact factors to rank journals. Apparently in conscious response to that view, they stated in an email message to me: 'It is worth noting that journal impact factors were not used [for applied mathematics and statistics journal ranking], but rather a calculation of the average citation rate of papers in a journal over a five year period was employed'. To me, this means that the ARC used five-year impact factor data, so I was hardly mollified by their revelation. I'm concerned that the ARC neither knows what an impact factor is nor that its use holds many dangers in the context of the mathematical sciences.

In particular, in a submission to the ARC on the subject of the ERA consultation paper, including journal ranking, the Society made the following points:

Members of the mathematical sciences community, including myself, are deeply troubled by the ARC's recently released journal ranking. We feel that, if it is allowed to stand and is used as part of a program to assess research performance, the ARC journal ranking will seriously damage mathematics and statistics in Australia. The shortcomings of the ranking are too numerous to itemise here, but the National Committee for the Mathematical Sciences will make a separate submission on this subject.

More generally, the international community of mathematical scientists has expressed significant concern about the use of citation data to infer journal rankings, or to determine the performance of mathematical scientists. In particular, the Institute of Mathematical Statistics, the International Council on Industrial and Applied Mathematics, and the International Mathematical Union have recently produced a joint report addressing the shortcomings of citation analyses.

(You can find the report in issue 35(3) of the *Gazette*.)

The Australian Mathematical Society contacted the Statistical Society of Australia and ANZIAM to see whether they would support approaches to the IMS and ICIAM, respectively, seeking their involvement in this issue. William Dunsmuir, President of the Statistical Society, quickly gave me his support, and just as promptly Phil Howlett agreed to take up within ANZIAM the issue of approaching ICIAM. The Australian Mathematical Society wrote to the IMS President, Jianqing Fan, who quickly sent a very helpful letter which the Society passed

on to the ARC with a letter of its own. This precipitated a rapid response from the ARC: The ARC CEO, Margaret Sheil, asked to meet me in Melbourne the following day. I was unable to attend the meeting, so I contacted Hyam Rubinstein, the Chair of the NCMS. He and Peter Taylor arranged to meet Professor Sheil that afternoon.

The meeting was very successful. It took place on 2 July, and two days later Professor Sheil sent the NCMS a letter which captured the main issues on which agreement was reached. Let me quote from that letter here, so that it is clear what has been achieved: (1) 'I would like to accept the National Committee's offer to review the journal list'. (2) 'I would also like to agree on the timeframe ... We would ask that all of NCMS's work to develop a revised journal list be completed by 14 August 2008'. (3) 'It is important that the NCMS's review includes engagement and feedback from the greater mathematics research community'. (4) The NCMS should 'add any peer reviewed journals and their requested ranking'. (5) The NCMS should 'revise rankings of existing journals that are currently in the list'. (6) Suggestions from the NCMS should be conveyed to the ARC using the standard form distributed to universities for their submissions.

Point (1) above clearly gives the green light to the NCMS to revise the ARC's ranking. In her letter Professor Sheil notes that 'the ARC will need to consider NCMS's input as a recommendation to be considered alongside feedback from the sector ...' This seems to make it clear that the ARC is willing to consider the NCMS recommendation in its own right, and that the ARC does not expect that recommendation to come to it as part of the general 'feedback from the sector'.

The Society has written to the IMS to thank them for their support, and to Professor Sheil to thank her for her willingness to accommodate the mathematical sciences community's perspective in the matter of journal ranking.

In addition to the Society's submission to the ARC, Phil Howlett has made an excellent submission on behalf of ANZIAM, pointing out that the ARC ranking was seriously deficient in the area of applied mathematics. His letter was particularly authoritative, and gave details of errors that were committed in the applied mathematics ranking. ANZIAM's active support in this issue is greatly appreciated.

In conclusion, I'd like to pay tribute to the very substantial, effective and energetic role that Hyam Rubinstein is playing in our efforts to revise the ARC rankings. Some of you will recall that, to produce the NCMS rankings last year, Hyam put together four subcommittees representing pure mathematics, applied mathematics, mathematical physics, and statistics and probability, respectively. When the ARC rankings were released, and I discovered that there were serious problems with them, I contacted Hyam and asked him to recall the subcommittees. He quickly agreed to do that, and has put a great deal of energy into the task of challenging the ARC's rankings. We all owe Hyam a substantial debt for his efforts.

I would also like to acknowledge the significant assistance provided by Jim Denier, who painstakingly compiled a comparison of the NCMS and ARC rankings. That must have been a very challenging task, and the results of Jim's work are also proving invaluable to our efforts.