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“Oppenheimer told me of a problem that was very much on his mind.”

François de Rose on the birth of CERN, page 174

Doping: similar problems arise in medical clinics

SIR — Donald Berry warns about the dangers of poor statistical understanding and misinterpretation of drug-testing results in Olympic athletes. Unfortunately, this same problem arises on a daily basis around the world in medical clinics, often with even greater consequences.

Berry illuminates the failure to use proper Bayesian reasoning in interpreting doping tests and also the problem of not having sufficient control-population norms for the tests to determine correctly whether an athlete is taking a banned substance or not. Clinicians typically have less understanding of Bayesian statistics than drug-testing officials and even fewer resources to interpret or norm such tests.

Take urine testing of patients on opiate therapy to make sure that they test positive for opiates (to show the patient is taking the medicine rather than, say, selling it) and that they are not using illegal drugs. Either a negative test for opiates or a positive test for an illegal substance can typically be sufficient to preclude a patient from receiving another prescription for opiates or to put the clinician in the position of having to explain the test result before prescribing the medicine.

Such tests need to be reported with the appropriate Bayesian interpretation. Also, as Berry advocates for Olympic athletes, patients should have the right (and access) to a statistical ‘consultation’ if they feel the test is in error.

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Playing the system to give low-impact journal more clout

SIR — A hundred years or so ago, a patent officer who was bored with his routine work wrote up his speculations on light quanta (A. Einstein *Ann. Phys.* **17**, 132–148; 1905), citing other people’s work to avoid long explanations. Today, there is a whole citation industry that — among other things — affects the impact factors of scientific journals, which in turn provide a gauge for the quality of an institution’s research output.

Publication in prestigious journals that have high impact factors encourages researchers to pursue trendy topics. It follows that investigators working in low-profile and under-researched fields are at a disadvantage because they publish in less well-known journals and generate fewer citations. This not only offends their institutions; in countries such as the Czech Republic it could fail to stimulate the flow of grant money.

The Swiss journal *Folia Phoniatica et Logopaedica* has a good reputation among voice researchers but, with an impact factor of 0.655 in 2007, publication in it was unlikely to bring honour or grant money to the authors’ institutions.

Now two investigators, one Dutch and one Czech, have taken on the system and fought back. They published a paper called ‘Reaction of *Folia Phoniatica et Logopaedica* on the current trend of impact factor measures’ (H. K. Schutte and J. G. Švec *Folia Phoniatr. Logo.* **59**, 281–285; 2007). This cited all the papers published in the journal in the previous two years. As ‘impact factor’ is defined as the number of citations to articles in a journal in the past two years, divided by the total number of papers published in that journal over the same period, their strategy dramatically increased *Folia*’s impact factor this year to 1.439.

In the ‘rehabilitation’ category, shared with 26 other journals, *Folia* jumped from position 22 to position 13. Publication there will now no longer disappoint the Dutch author’s colleagues for lowering their institution’s score, and should encourage the Czech government to spend more money on the Czech author’s university.

Could professional scientometrists one day be in demand, to guide young scientists up the citation ladder of scientific survival and allow them to do some good, modest science in their spare time, just for fun?

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Changing the rules won’t stop the rise of a new superpower

SIR — In their Essay ‘The end of the science superpowers’ (*Nature* **454**, 412–413; 2008), J. R. Hollingsworth and colleagues argue that the pattern of rise and decline of science superpowers such as France, Germany and Britain is now catching up with the United States. Surprisingly, they see a shift not towards Chinese scientific hegemony but towards multipolarity.

They argue that the decline of the United States indicates the end of a model of scientific production, that ‘big’ science is finished and that small interdisciplinary institutes, where new ideas can flourish, are taking over. In this context of altered dynamics, they conclude that US science can prosper alongside contributions from elsewhere.

This argument ignores a persistent pattern in the history of science. Calls for interdisciplinarity and creativity always arise when leaders are confronted with new competition from outside. Such calls are often

a sign that the callers are losing this competition.

One of the strengths of science is that its rules of engagement are clear, making it possible for anyone to participate if they take the effort to learn the rules. This means that there is always room for newcomers taking scientific development to its next logical step, overtaking formerly dominant elites. As the authors point out, this happened to France in the mid-nineteenth century, to Germany in the 1920s, and to Britain after the Second World War.

A typical reaction of elites under threat is to raise entry barriers to their circle by placing emphasis on knowledge unavailable to newcomers. For example, they may trade the universal language of their science for methods relying on culturally specific ‘general knowledge’ and interdisciplinary meta-perspectives that come only with a broad education. Laborious scientific methods no longer suffice; creativity and reflection count. For outsiders, the road to success by acquiring leadership in specialized fields is blocked.

History teaches us that discourses of interdisciplinarity and creativity offer temporary refuge for embattled elites, but eventually do not stop the process of shifting scientific hegemony. They result in isolated, inward-looking scientific communities. Much of the post-hegemonic academic discourse in France and Germany illustrates this. If the United States is to avoid this fate, it should increase scientific funding rather than trying to shield itself from competition by changing the rules.

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