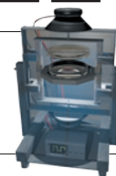


THIS WEEK

EDITORIALS

PUBLIC RELATIONS On chickens, Twitter and the Haldane principle **p.6**

WORLD VIEW The blooming biodiversity of the age of man **p.7**



ELECTRONICS Shake and rattle to improve the rock and roll **p.9**

Science without borders

The idea of standardizing science and removing barriers to research mobility across Europe is simple, but putting it into practice has proved more challenging.

The turn of the millennium was a time of optimistic ideas of change. European heads of state agreed to establish a utopian cross-border system that would allow the free exchange of ideas, technology and, most crucially, researchers themselves.

According to the official timetable, this European Research Area (ERA) should be in place by next year. Fat chance. Writing in this publication last month, Paul Boyle, the president of Science Europe, the Brussels-based organization of research councils, outlined the not inconsiderable obstacles to putting some of the apparently simple changes into practice, and argued that the timetable imposed was much too short (P. Boyle *Nature* **501**, 157–158; 2013).

This week, *Nature* spoke to Robert-Jan Smits, director-general of the research commission of the European Union (EU), which published the 2013 ERA progress report on 20 September. He thinks otherwise: implementation is way overdue. “We’ve been talking about this for 13 years!”

The idea is devilishly simple, but the devil, as always, is in the detail. According to the commission’s plan, each member state should distribute most of its national research funds competitively. Research agencies should allow some funds to be shared across borders to address grand challenges or to build research infrastructures. Recruitment should be open and merit-based. Universities and research institutes should promote gender equality. Information should be open access. The idea is for all countries to have the same standards within which their scientists can thrive, and for all the barriers to research mobility to be removed.

Not all of it is difficult, Smits says. “How hard can it be for a university to put together a gender action plan? Yet fewer than 20% have.” He reels off a list of other failures detailed in the September report. Almost half of researchers surveyed say they are unhappy with the transparency of recruitment procedures at their institutes. In some nations, barely 40% of research funds are distributed through competitive calls (in the most ERA-compliant countries the figure is closer to 80%). Countries have been slow to participate in joint research programmes that pool national money, or to make it easy for all comers to use some European scientific infrastructures.

But as an EU representative, Smits spins positive, listing the improvements that have been achieved and insisting that there is still time for the ERA process to be completed before 2014 ends.

The Nordic countries, Germany and the United Kingdom are doing well in the ERA process. Smits would not be drawn on which countries are doing badly, although it is likely that many of the former communist countries who have joined the EU since 2007 are among them.

Next year, the research commission will bring out the sticks if slow progress continues. It will name and shame non-complying countries, as well as organizations such as Science Europe and the League of European Research Universities that signed up to deliver the ERA to timetable. And if that doesn’t work, as research commissioner Máire Geoghegan-Quinn told European ministers last week, the commission will consider drafting legislation to legally require steps towards

the ERA to be taken — a particularly painful prospect for the world of academia, which likes to be self-governing.

So who is to blame for the ERA being off schedule? The commission is scientists’ favourite whipping boy, but cannot be handed the blame this time. The universities and research organizations must shoulder a large

“Without raising the potential, the European research base will remain static.”

share of the responsibility for not putting into practice what they signed up to do. After all, it is these organizations’ scientists who will benefit from all that the ERA stands to offer. But those organizations cannot be held responsible for the genuine difficulties in breaking through endemic corruption in countries such as Romania, which actively operates against

merit and competition (although stands to gain the most from the ERA).

Does it matter if the ERA is not fully in place next year, especially given that the research base is better than it was as a result of the exercise? In the short term, it perhaps does not. Europe will muddle through. In the long term, yes it does. Without raising the potential by spreading world-level excellence from rich countries such as Germany and the United Kingdom to the periphery, the European research base will remain static and will probably be overtaken by growing Asian economies.

The commission is right to keep up the pressure. Europe’s academic community has not found a way to govern itself into a system that gives equal opportunity to all of its scientists. Maybe it never will. It seems that the carrot — a more secure and high-flying future — is not enough. The stick of having rules enforced from above may prove more effective. ■

Dangerous work

Behavioural geneticists must tread carefully to prevent their research being misinterpreted.

Intelligence tests were first devised in the early twentieth century as a way to identify children who needed extra help in school. It was only later that the growing eugenics movement began to promote use of the tests to weed out the less intelligent and eliminate them from society, sparking a debate over the appropriateness of the study of intelligence that carries on to this day. But it was not the research that was problematic: it was the intended use of the results.

As the News Feature on page 26 details, this history is never far from the minds of scientists who work in the most fraught areas of behavioural genetics. Although the ability to investigate the genetic factors that underlie the heritability of traits such as intelligence, violent

behaviour, race and sexual orientation is new, arguments and attitudes about the significance of these traits are not. Scientists have a responsibility to do what they can to prevent abuses of their work, including the way it is communicated. Here are some pointers.

First: be patient. Do not speculate about the possibility of finding certain results, or about the implications of those results, before your data have even been analysed. The BGI Cognitive Genomics group in Shenzhen, China, is studying thousands of people to find genes that underlie intelligence, but group members sparked a furore by predicting that studies such as theirs could one day let parents select embryos with genetic predispositions to high intelligence. Many other geneticists are sceptical that the project will even find genes linked to this trait.

Second: be accurate. Researchers should design studies on the basis of sound scientific reasoning. For instance, in light of increasing evidence that race is biologically meaningless, research into genetic traits that underlie differences in intelligence between races, or that predispose some races to act more aggressively than others, will produce little. Furthermore, it is common for small studies of behavioural genetics to go unreplicated, and there are increasing concerns that the science of behaviour more generally suffers from poor practice, exaggeration and irreproducibility (see *Nature* <http://doi.org/n2m>; 2013). Scientists should refrain from claiming that they have found a basis for any complex trait until the results have been replicated and confirmed in large, definitive studies, such as multiple meta-analyses.

Third: be sensitive. Even if scientists have truly honourable intentions, they must realize how easy it can be for studies on socially favoured groups to seem self-serving. For instance, BGI's study of exceptionally intelligent individuals is itself led by people who are unusually bright, even in the cognitively enriched domain of science: there is a child prodigy who dropped out of high school to work on

genomics; a physicist who graduated from university at age 19; and an International Mathematical Olympiad gold medallist. When such people make statements in favour of selecting embryos for intelligence, it can seem to the public as if the researchers think that society would benefit from the birth of more people just like them — even if this is not what they have in mind.

Finally: be proactive. Once scientists are sure of their results, they usually do their best to explain the significance of their work in academic publications. But these texts are often impenetrable to the public and may include technical terms that can be misinterpreted by non-specialists. To provide clarity, scientists would do well to follow the example of the Social Science Genetic Association Consortium. In June,

this group published a paper on genetic variants associated with educational attainment (C. A. Rietveld *et al.* *Science* 340, 1467–1471; 2013). Accompanying this was a nine-page Frequently Asked Questions document that, in plain, easy-to-understand language, addressed such questions as why the researchers did the study, what they found and what the implications of the work are — and are not (see go.nature.com/7mov2j). The document spelled out that the consortium had not found 'the gene' for educational attainment, that each genetic marker found has only a very small effect on length of schooling, and that any policy response based on that single study would be premature.

Scientists cannot be held responsible every time someone misinterprets their work. But simple steps such as these could help to prevent and address some of the potential distortions of behavioural genetics — and could help to ensure that society continues to support the work. ■

Cross the road

Research on chickens is legitimate — but scientists and funders must learn to justify it.

Taxpayers underwrite many public services, including the funding of science. So it is entirely right for them to question funding decisions. If they do, granting agencies should have mechanisms for responding in ways that are informed but not patronizing.

On 18 September, the UK Arts and Humanities Research Council (AHRC) announced nine grants, most of which aimed to bridge the gap between science and the humanities. The majority were uncontroversial. Nobody blinked, for example, at the £1.95 million (US\$3.1 million) given to Colin Blakemore of the Institute of Philosophy in London for a project entitled 'Rethinking the Senses: Uniting the Philosophy and Neuroscience of Perception'. No eyebrow was raised when Randolph Donahue at the University of Bradford got £1.98 million to study 'Fragmented Heritage: From the kilometre to the nanometre: Automated 3D Technology to Revolutionise Landscape, Site and Artefact Analyses'.

But when Mark Maltby at Bournemouth University was awarded £1.94 million for 'Cultural and Scientific Perceptions of Human-Chicken Interactions', the reaction from some tabloid newspapers was predictable. "A birdbrained idea? Outrage as academics are handed £2m to study how humans interact with CHICKENS," crowed *The Daily Mail*. "Chicken study costing £1.9million of taxpayers' funds causes a flap," squawked *The Daily Express*.

Why the outrage? Could it be that journalists came across the AHRC press release, recognized the word 'chicken' in the morass of science-speak and went for an easy sell — lambasting the indulgence of barmy boffinry with taxpayers' money at a time of austerity? Why 'easy'? Well, whereas not many people know much about neuroscience

or nanometres, everyone knows what chickens are. So much so that they feel they can take interactions with the birds for granted, and ask what more we would learn by spending almost £2 million on the subject. It is in that familiarity, however, that the questions lie. We know surprisingly little about the history of human-chicken relations, such as how chickens first came to Britain.

Behind the over-excited headlines lies a legitimate question about accountability. If it is right and proper for researchers, rather than politicians, to decide how public funds should be spent (the 'Haldane principle'), then those researchers should be ready to justify such decisions, promptly and simply. For example, after Greger Larson of Durham University appeared on radio and television this year to talk about his work on the domestication of dogs, he received an e-mail that demanded, bluntly, whether the £1 million being spent on such a subject came from the taxpayer. Larson replied with a polite, informative and, most importantly, personal e-mail explaining where the money came from — and how it fitted into the context of UK government funding.

The denigration of science by media outlets and some politicians relies on an us-against-them mentality. This can be weakened by individual personal engagement such as Larson's. Many corporations are breaking down barriers by interacting with customers through social media such as Twitter and Facebook, replying to comments much faster than they would through more conventional, formal channels. Customers appreciate the speed of service and the fact that it can be personalized, and come to feel more engaged with that corporation's aims.

Research bodies have not been slow to use such media. The AHRC, for example, has a Twitter feed (@ahrcpress), as does the Natural Environment Research Council, which funded Larson (@NERC-science). It is only a matter of time before taxpayers communicate routinely with researchers using such methods. Informal networks will help the public to become more engaged with the work that their money funds — demonstrating the value, if you like, of human-human interactions. ■

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