How Science Lost its Voice

Everyone agrees that government policy should be based on sound science. But this advice is useless if we can't tell which science is sound. The Federal government takes its advice on climate policy from Prof. Ross Garnaut, but according to Senator Nick Minchin, Prof. Garnaut has no authority on this matter because he is an economist and not a climate scientist (Sky News, 10.03.11). Professor Tim Flannery has been appointed Climate Change Commissioner, but Senator Barnaby Joyce has questioned his credentials for the job because Prof. Flannery's PhD is in paleontology (Q & A, ABC TV, 21.02.11). Cardinal George Pell rejects anthropogenic climate change, and has contrasted his own contribution to the debate with the 'unscientific' remarks of Dr Greg Ayers, an atmospheric chemist who heads the Australian Bureau of Meteorology (*Herald*, 14.03.11). In the light of all this, how can the well-intentioned voter determine who speaks with the authority of science?

The traditional answer has been to ask the institutions of science. The Australian Academy of Science, CSIRO, and professional societies such as the Australian Meteorological and Oceanographic Society (AMOS), all have good claims to speak for science. The orthodox view of climate change was produced in this way—by consulting the scientific community through its institutions. But this approach to defining sound science is apparently no longer enough. Respected public figures now argue that the scientific consensus is not based on sound science.

Perhaps we can determine what is sound science by reflecting on the scientific method. If Senator Minchin or Cardinal Pell's beliefs are more scientific than those of climate scientists, this must be because their sources used the scientific method, and the climate scientists did not. The study of scientific method is the traditional task of the philosophy of science. The most famous philosopher of science is undoubtedly Sir Karl Popper, who denounced psychoanalysis, astrology and many others fields as 'pseudoscience'. According to Popper, a theory is only scientific it if can be falsified by observation and experiment. Popper's simple test is not adequate—major scientific theories are complex and can rarely be conclusively tested by one or even a few experiments—but efforts to distinguish sound from unsound science continue.

Ideas about scientific method clearly play a role in the climate-change debate. Cardinal Pell called for debate to be based on 'scientific facts', but in our experience the invocation of 'facts' usually signals confusion about how science works. In one sense the 'facts' are the data—the specific observations that scientists make. But all data contains errors, and data usually consists of estimates of greater or lesser accuracy. When the data do not fit a well-established theory, it is often because the data are wrong. Every undergraduate laboratory class produces data inconsistent with current theory, and these data are rightly ignored. In another, more profound sense, the 'facts' of science are well-established theories, tested in many different ways, and now closely woven into the fabric of science. But all scientific theories are open to revision and improvement.

The fact that much climate science is based on models rather than direct observation arouses many people's suspicions. But models are an essential part of science. Scientific idealisation—simplifying the details to get a mathematically and experimentally workable model—is how science deals with complexity. Models, like science in general, are fallible and sometimes give the wrong answers. That is not news, and it is most definitely not a reason for scepticism. Climate models are not a substitute

for ‘facts’, invented to firm up the case for anthropogenic climate change. Modelling is an essential part of the scientific method.

We have long past the point at which society can function smoothly while believing whatever is politically expedient about scientific questions. Our collective future depends on voters getting, and believing, the best information that science can offer. That includes recognising and dealing with scientific uncertainty. The right attitude to science is captured in the title of eminent chemist Theodore Brown’s book *Imperfect Oracle: The Epistemic and Moral Authority of Science*. Science is the only oracle we have. We need to learn to live with its imperfections and listen to what it tells us. Dwelling on those imperfections in order to silence science is the road to ruin.

The issue of the authority of science will be the subject of a free, public Roundtable discussion in the New Law School Foyer, University of Sydney from 5-7pm on Friday 8th April, as part of an international academic conference on this question hosted by the Sydney Centre for the Foundations of Science at the University of Sydney.

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