



Evidence, Opinion and Interest – the attack on scientific method

2014 Distinguished Fellows Lecture

Annual Dinner of the Royal Society of New South Wales,
The Union, University and Schools Club,
25 Bent St, Sydney, 7 May, 2014

Barry Jones

AO, FAA, FAHA, FTSE, FASSA, FRSA, DistFRSN, FRSV, FACE

Abstract

Science and research generally are given disturbingly low priority in contemporary public life in Australia, although medical research and astronomy may be exceptions. Scientists, especially those involved with climate change, or the environment, have come under unprecedented attack, especially in the media, and the whole concept of scientific method is discounted, even ridiculed. In a complex world, people seem to be looking for simple solutions that can be expressed as slogans, and the quality of public debate on scientific issues has been trivialised, even infantilised. The controversy on anthropogenic global warming (AGW) has been conducted at an appalling level on both sides of politics. (Debates on refugees and taxation have been conducted at a similar level.) Vaccination, fluoridation and even evolution are hotly, but crudely, disputed in some areas. Despite Australia's large number of graduates (more than 4,000,000), our 38 universities and intellectual class generally have very limited political leverage and appear reluctant to offend government or business by telling them what they do not want to hear. Universities have become trading corporations, not just communities of scholars. Their collective lobbying power seems to be weak, well behind the gambling, coal or junk food lobbies and they become easy targets in times of exaggerated Budget stringency. Paradoxically, the Knowledge Revolution has been accompanied by a persistent 'dumbing down', with ICT reinforcing the personal and immediate, rather than the complex, long-term and remote. In a democratic society such as Australia, evidence is challenged by opinion and by vested- or self-interest. Australia has no dedicated Minister for Science with direct ownership/ involvement in promoting scientific disciplines. If every vote in Australian elections is of equal value, does this mean that every opinion is entitled to equal respect? It is easy to categorise experts as elitists, and out of touch. There are serious problems in recruiting science teachers, and numbers of undergraduates in the enabling sciences and mathematics are falling relative to our neighbours. In an era of super-specialisation, many scientists are reluctant to engage in debate, even where their discipline has significant intersectoral connections. Science has some outstanding Australian advocates, Gus Nossal, Peter Doherty, Ian Chubb, Fiona Stanley, Robert May, Brian Schmidt, Ian Frazer, Mike Archer among them, but they lack the coverage that is needed and that they deserve. There is a disturbing lack of community curiosity about our long term future, with an apparent assumption that consumption patterns will never change.

"The best lack all conviction, while the worst
are full of passionate intensity"

W.B. Yeats, 'The Second Coming', 1919.

What am I doing here?

I was Australia's longest serving Science Minister (1983-90), I think, in part, because nobody else wanted the job. Before and after that period I have maintained an intense interest in science / research and its implications for public policy and politics generally.

I have often been asked about how I came to be so heavily involved in Science policy and thinking about Australia's future, so let me begin with some personal reflections.

From childhood, I was deeply involved, obsessed even, in the history and philosophy of science and read HG Wells, JBS Haldane and Julian Huxley avidly. Jules Verne, too. These names, so important to me then, may be unfamiliar now. I tried to apply much of what I had learned about science in my political career, such as it was.

Despite having been a Member of State and Commonwealth Parliaments for 26 years, and a Minister for seven, I left politics with a profound sense of frustration and unease.

Political colleagues saw me as too individual and idiosyncratic, totally lacking in the killer instinct, while many in the academic community might have seen me as too political, even too populist.

My book *Sleepers, Wake!* was published by Oxford University Press in 1982, 32 years ago, and its success, both here and internationally, mystified and irritated many of my colleagues. It went through 26 impressions and was translated into Chinese, Japanese, Korean, Swedish and Braille.

Three decades on, my central thesis stands up pretty well. My major fault was in being too

cautious about the speed and impact of change. But in trying to predict the social, economic and personal impact of technological change, in 1982 I was Robinson Crusoe. I'll amend that in case you have not read Daniel Defoe: I'll say, 'I was on my own'.

Also, in politics, and in most other areas of life, nobody likes to be reminded: 'I told you so'.

In politics, my timing was appalling.

In October 1985 when I became the first, and, so far, only Australian Minister invited to address a G7 Conference, in Canada, the reaction of my colleagues was not celebration but irritation – 'Why him?'

I kept raising issues long before their significance was recognised. That made me, not a prophet, but an isolated nerd.

I can claim to have put six or seven issues on the national agenda, but I started talking about them 10 > 15 > 20 years before audiences, and my political colleagues, were ready to listen.

In politics, timing is (almost) everything and the best time to raise an issue is about ten minutes before its importance becomes blindingly obvious.

The issues were:

(i) Post-industrialism: the sharp decline in manufacturing as an employment sector due to the globalisation of markets and revolutionary changes in production techniques, leading to a sharp reduction in labour demand.

(ii) Information Revolution – transition to digital society / economy, with the development of low-cost personal computing, new ICT tools, and the development of the Internet, WWW and social networking.

(iii) Global Warming / Climate Change. I began talking about climate change, the impact of greenhouse gases and the human contribution to their production as Minister for Science, in 1984, so I have form in this matter. My timing – being far too early – was a major mistake. In March 1989 I spoke at a Conference in London, at the invitation of Mrs Thatcher, when Al Gore and I were the keynote speakers.

(iv) Antarctica. I argued for the need to preserve it for science, as a global climate laboratory.

(v) Biotechnology. I was fascinated by the implications of the DNA revolution and seized the opportunity to have discussions with some of the great figures in the genetic revolution, Crick, Watson, Perutz, Sanger.

(vi) Heritage. This involves trying to understand our history, places, environment and social context, and I worked on this area at UNESCO in Paris, on and off, between 1991 and 1996.

(vii) ‘The Third Age.’ The social, economic and political implications of the steady increase in longevity, especially since the 1950s, in which there has been a two and a half year increase in life expectancy for each decade of elapsed time. I worked on social policies for an ageing society in Cambridge in 2000 and 2001.

I was also heavily involved in securing the abolition of capital punishment in Australia,

reviving the Australian film industry and attempting to promote creativity in education.

My repertoire has been broad (even shallow) rather than deep and specialised. But I’m not bad at making connections – joining the dots’, to use the current cliché.

The role of Science in policy development is a sensitive issue, because I have spent years, decades really, bashing my head against a brick wall trying to persuade colleagues to recognise the importance, even centrality, of Science policy.

Science and research generally are given disturbingly low priority in contemporary public life in Australia, although medical research and astronomy may be exceptions. Scientists, especially those involved with climate change, or the environment, have come under unprecedented attack, especially in the media, and the whole concept of scientific method is discounted, even ridiculed. In a complex world, people seem to be looking for simple solutions that can be expressed as slogans, and the quality of public debate on scientific issues has been trivialised, even infantilised.

Gus Nossal sometimes quotes me as saying that Australia must be the only country in the world where the word academic is treated as pejorative.

Many, probably most, of my political colleagues had no interest in science as an intellectual discipline, although they depended on science for their health, nutrition, transport, entertainment and communication.

When I was Minister for Science, one of my Caucus colleagues, who later succeeded me in that role, took me to a demonstration of a perpetual motion machine in his home state,

an invention which, he argued, would radically reduce the cost of living and manufacturing.

I saw the demonstration but was not persuaded.

My colleague was deeply disappointed by my scepticism. He asked why I dismissed the project. I said, 'Well, it can't be valid because it is in breach of the Second Law of Thermodynamics'. My colleague responded, 'We should repeal it.'

I was saddened that in all the tributes to Neville Wran in the past fortnight, there was no recognition of the five years he spent as Chair of CSIRO (1986-91). I took this as a confirmation of how far science has fallen off the political agenda.

As you are all well aware, currently Australia has no dedicated Minister for Science, although the title is a letterhead filler for the Minister for Industry. Research, including the ARC, is part of the responsibility of the Minister for Education, and the NH&MRC is under the Minister for Health. The recent National Commission of Audit characterised research as an expense, not an investment. The Commission might have regarded Wi-Fi, developed in the course of pure research by CSIRO, as a self-indulgent extravagance.

The lack of a dedicated Science Minister means that nobody in Government takes on personal ownership of science and acts as its advocate in Cabinet.

Science, Complexity and the Common-sense View of the World

There are major problems about explaining some of the issues in science, and has been ever since science began.

Some fundamental scientific discoveries seem to be counterintuitive, challenging direct observation or our common-sense view of the world.

Common sense, and direct observation, tells us that the Earth is flat, that the Sun (like the Moon) rotates around the earth and that forces don't operate at a distance.

Aristotle with his encyclopaedic – but often erroneous – grasp of natural phenomena, was a compelling authority in support of a geocentric universe, and that the seat of reason was in the heart, not the brain, and that females were deformed males. His views were dominant for 1500 years. The Greek astronomer Ptolemy, following Aristotle, provided ingenious proofs in support of geocentrism.

Then along came Copernicus, Galileo and Kepler who said, 'Your common sense observation is wrong. The orbits of the Sun and Moon are completely different, although they appear to similar.' (Our use of the terms 'sunrise' and 'sunset' preserves the Ptolemaic paradigm.)

By the 20th Century, electronics enabled us to use forces at a distance, do thousands of things remotely, manipulating spacecraft and satellites, or receiving signals (radio, telephony, television), setting alarms, opening garage doors and, one of the great labour saving devices, the remote switch for television.

The most obvious disjunction between science and common sense is the question: 'Right now, are we at rest or in motion?'

Common sense and direct observation suggests that we are at rest.

But science says, ‘Wrong again. We are moving very rapidly. The earth is spinning on its axis at a rate of 1669 kph at the equator, and in Sydney (33.5°S) at 1388 kph. We are also orbiting round the Sun even faster, at nearly 30 kps, or 107,200 kph.

There are further motions, harder to measure, as the universe expands – and it’s speeding up, as our Nobel Physics Laureate, Brian Schmidt, postulates.

But, sitting here in Sydney, it is hard to grasp that we are in motion, kept in place by gravity.

Psychology resists it – and essentially we have to accept the repudiation of common sense on trust, because somebody in a white coat says, ‘Trust me, I’m a scientist.’

I would challenge anyone to reconcile common sense and quantum theory or to satisfactorily explain the Higgs boson or – hardest of all – to define gravity, although I suspect that Michelle Simmons could have made a credible attempt.

Scientific/ Analytical Method

Scientific method, rational analysis and evaluation of evidence has been a central factor in defining Western society and culture since the Renaissance, and these skills can be / should be applied to a variety of disciplines – politics, law, economics, social sciences, health. Scientists have come under unprecedented and damaging attack arising from the climate change controversy.

We must distinguish between scientific scepticism (a central element in testing evidence, for example Karl Popper’s falsifiability test) and cynicism (dismissing evidence, however compelling, to promote confusion, inaction or vested interest.) Scientific vocations are falling in Australia,

and this has important implications for our future economic and scientific capacity. Governments have an obligation to take up and understand the challenges raised by science, reach a national consensus in promoting the importance of science in our national life, encourage investment in science-based processes and products for which there is international demand.

Political processes work on an assumption of common, or shared, knowledge – and this may be more fragile than we are prepared to recognise.

Robyn Williams of ABC Radio National’s Science Show tells the horror story of addressing an audience of teachers – I should emphasise, not *science* teachers – some years ago when he asked, ‘How many of you have never eaten food with DNA in it?’ More than half the audience put up its hands.

The debate on climate change, especially anthropogenic global warming (AGW), has been a particularly disturbing illustration of how ill-equipped we seem to be in conducting serious debate and employing experimental method.

There are three areas of attack against expertise and taking a long term, analytical view of the world – from the Right, the Left and the anxious Centre.

From the Right there have been systematic and well-financed attacks by lobbyists from the minerals industry generally, especially coal and oil, and electricity generators. This has been highly personal, often abusive, sometimes threatening.

The anxious Centre includes people working in a particular industries and particular regions (Hunter Valley, La Trobe Valley, Tasmanian

forests), understandably fearful of potential job losses, without much prospect of creating new jobs. The trade union movement is deeply divided on this – as is the business community.

But from the Left, or some segments of the intellectual left, a deconstructionist mind-set has partly undermined an evidence-based approach to policy making or problem solving.

The pluralist or deconstructionist, or post modern, theory of knowledge is contemptuous of expertise, rejects the idea of hierarchies of knowledge and asserts the democratic mantra that – as with votes in elections – every opinion is of equal value, so that if you insist that the earth is flat, reject vaccination for children or deny that HIV-AIDS is transmitted by virus, your view should be treated with respect. Similarly, there has been a rejection of expertise and or taste – rejecting the idea of people like Harold Bloom, or me, that there is a ‘Western canon’ which sets benchmarks. No, say the deconstructionists, the paintings of Banksy, the mysterious British graffiti artist, are just as good as Raphael, that hip-hop performances are just as valid as Beethoven’s Opus 131.

Evidence vs. Opinion

There is a disturbing conflict between evidence vs. opinion (‘You have evidence, but I have strong opinions.’) and political processes tend to be driven by opinion rather than evidence in a short political cycle.

The Cambridge political scientist David Runciman argues that ‘opinion, interest and knowledge are too divided, and no event, whether an election ... or a crisis is clear enough in its meaning to bring closure’.

Creationism vs. evolution, the age of the earth (Genesis vs. geology), smoking as a cause of lung cancer, the safety of vaccination and fluoridation, whether HIV-AIDS is transmitted by virus, ‘alternative medicine’, controversies about the authorship of Shakespeare’s plays, the Kennedy assassinations, the survival of Elvis, even the historical truth of the Holocaust, are all examples of recent controversies which promote a confusionist mind-set and earn some people more attention than they deserve.

The Welsh geneticist Steve Jones asks an important question: If there is a division of scientific opinion, with 999 on one side, and one on the other, how should the debate be handled? Should the one dissenter be given 500 opportunities to speak?

Scientists are not immune from vanity, and some dissenters on climate change have been encouraged by being told: ‘The most important scientific factor in the climate change debate happens to be your area of expertise. Everyone else has it wrong. Only you are right’.

There has been a sustained attack from some quarters on scientific research and scientific method, even on rationality and the Enlightenment tradition. The illusion was created that scientists are corrupt, while lobbyists are pure. One of the false assertions is that scientists who take the mainstream position are rewarded, while dissenters are punished (similar to Galileo and the Inquisition). In Australia and the United States the contrary could be argued.

Scientists arguing for the mainstream view have been subject to strong attack by denialists who assert that they are quasi-religious zealots who are missionaries for a

green religion. In reality, it was the denialist / confusionist position to rely on faith, the conviction that there were a diversity of complex reasons for climate change but only one could be confidently rejected: the role of human activity.

The Infantilisation of Debate

Australia, like the US, UK, Canada and much of Europe, has undergone a serious decline in the quality of debate on public policy.

The British journalist Robert Fisk has called this ‘the infantilisation of debate’.

Just over 1,015,000 people (about 900,000 of them locals) are currently studying at Australian universities, both undergraduate and postgraduate. Australia has 4,000,000 graduates, far more than the total numbers of traditional blue collar workers. Inevitably these numbers will shift our political culture, but the process is occurring slowly. Members of trade unions amount to about one million people – 18 per cent of the total work force and about 12 per cent of the private sector.

Currently we are, by far, the best educated cohort in our history – on paper, anyway – but it is not reflected in the quality of our political discourse. We appear to be lacking in courage, judgment, capacity to analyse or even simple curiosity, except about immediate personal needs.

In the era of ‘spin’, when a complex issue is involved, leaders do not explain, they find a mantra (‘Stop the boats!’) and repeat it endlessly, ‘staying on message’, without explanation or qualification. The word ‘because’ seems to have fallen out of the political lexicon.

The killer punch against the Knowledge Nation Report produced in 2001 was the

notorious ‘complexity diagram’, all my own work. The decisive argument against the document was to say, ‘But it’s too complex’. Well, yes, indeed, that was the whole point of a complexity diagram.

An unexpected result of the ICT Revolution has been the development of social media, personal / self-referential, immediate, material, trivial – the smart phone as the ‘new best friend’, a love object in itself. ICT provides access to the universe with its astounding diversity, but observation of its users suggests that the personal has displaced the universal.

The eminent science writer James Gleick in his *Faster: The Acceleration of Just About Everything* (2000) calculated that in the United States the average time taken by a politician to complete his/her answer to a question on television was 8.2 seconds. I suspect that in Australia it would be longer – closer to 10 seconds.

There is fierce opposition in some quarters to the vaccination of children and the fluoridation of water supplies to prevent dental caries, even though the empirical evidence in support of both is overwhelming. But appeals to fear can be far more powerful than arguing on the basis of hard evidence.

Evidence-based policies and actions should be a central principle in the working of our system and reliance on populism and sloganeering should be rejected, but in reality they are not.

There was a very disturbing debate on climate change between Prof. Ross Garnaut and Clive Palmer on the ABC’s *Lateline* program on Friday 4 April, and you can view it for yourselves, if you can bear it, on YouTube. Ross Garnaut, an outstanding economist, was

author of the *Garnaut Climate Change Review*¹, an encyclopaedic work. But the debaters had no common ground. Prof Garnaut relied on evidence. Clive Palmer despite, or even because of, his vested interest as a coal miner, kept repeating the same mantra, over and over again, and never addressed the complex argument that Prof. Garnaut advanced. I suspect that many viewers, even late night viewers of the ABC, might have found Palmer's argument simpler to follow and to have been turned off by complexity, however compelling the evidence.

Tackling complex problems will demand complex solutions (e.g. refugees, climate change) which cannot be reduced to parroting a few simple slogans ('turn back the boats', 'stop this toxic tax'). 'Retail politics', sometimes called 'transactional politics', where policies are adopted not because they are right but because they can be sold, is a dangerous development and should be rejected. We must maintain confidence that major problems can be addressed – and act accordingly. Revive the process of dialogue: explain, explain, explain, rejecting mere sloganeering and populism. We need evidence-based policies but often evidence lacks the psychological carrying power generated by appeals to prejudice or fear of disadvantage ('They are robbing you...'). A voracious media looks for diversity and emotional engagement, weakening capacity for reflection and serious analysis, compounded by the rise of social media where users, typically, seek reinforcement of their views rather than being challenged by diversity.

Score Card

Australia ranks next to Norway on the United Nations' Human Development Index (HDI),

taking account of life expectancy, years of education and gross national income.

There is a long list of positives in our national history: democratic parliaments, free elections, probably the world's best electoral system (the Western Australian Senate poll in 2013 notwithstanding), pioneers of the secret ballot and universal suffrage, strong legal system with internationally respected courts, tradition of religious tolerance (although it could, in part, be indifference), secular education (but with some limits), good research (universities and CSIRO), excellent medical standards, superior public service, the ABC, courageous disaster relief.

But there are negatives as well: the long tradition of Aboriginal dispossession, burying their history, using them as quasi slave labour (and even worse), extraordinary rates of incarceration and domestic violence, brutality in the convict system (especially Norfolk and Sarah Islands) and the racism implicit in the White Australia Policy.

There has been a strong vein of authoritarianism in our system, often covered by the explanation, 'we are doing it for their own good', a rigidity, harshness, cruelty, even sadism in institutions – armed forces, churches, schools, orphanages. Churches, Parliaments, political parties, corporations, the media are all provoking community disquiet, with histories of corruption, suppression, secrecy and violence. The current Royal Commission about child sexual abuse presents evidence with a horrifying consistency. Treatment of asylum seekers shows unconscionable (but bipartisan) harshness. Vested interest is far easier to promote and secure than community interest.

We also have had a poor record in securing economic rights for women, discouraging

¹ Written in 2008; see www.garnautreview.org.au.

them from entering public life or the professions, our uncritical involvement in foreign wars and our acquiescence and credulity in the surveillance state.

Scientists and learned societies have been punching below their weight in matters of public policy, and they have advanced many reasons to avoid being involved in controversies outside their disciplines, the possible threats to grants being among them. We have distinguished scientists who are outstanding advocates, including Gus Nossal, Peter Doherty, Ian Chubb, Fiona Stanley, Robert May, Brian Schmidt, Ian Frazer, Mike Archer, Tim Flannery, Dick Denton being among them. Science must be at the core of our national endeavour and you are well placed to examine the evidence, evaluate it, then advocate and persuade. Our nation's future depends on the quality of its thinking, and its leaders.

I encourage you, whatever your political persuasion, or lack of it, to argue for higher recognition of the role that science must play in our future, and drive your MP mad unless or until he/ she does something about it.

Remember Archimedes and his lever.

But first you have to find a fulcrum, then you push the lever.

Sustained attacks on the mainstream scientific arguments for the need to take action to mitigate anthropogenic climate change have been from groups which could more accurately be described as 'confusionists', than 'deniers' or even 'sceptics'. The opponents do not analyse the evidence and advance alternate hypotheses which are themselves testable: their main goal is to promote confusion. To confusionists,

persuading citizens to conclude 'I just don't understand' is a very satisfactory outcome.

The international community readily accepted the argument that CFCs (chlorofluorocarbons) used as propellants in aerosol sprays were depleting the ozone layer, although their volume as a percentage of the atmosphere is infinitesimal compared to CO₂ and methane. This is in striking contrast to the combination of fury, hysteria and mendacity against the evidence of global warming. The explanation is that in the case of CFCs every chemical company was convinced that there were economic advantages in getting in first with HFCs (hydrofluorocarbons) as an alternative propellant, and that substitutes for CFCs could be adopted without economic dislocation and changes in consumption. But to much of the fossil fuel industry the global warming challenge is a fight to the death.

Publications by climate change denialists / sceptics mostly fall into two categories, knockabout polemic (mostly *ad hominem*) and objectors to a particular point of detail. The publications do not appear in refereed journals which suggests sharply alternative explanations – (i) that the material is not credible, testable or evidence-based, or, (ii) that there is a conspiracy by a scientific Mafia to suppress dissent. (Denialists are strongly drawn to the second alternative).

Both Whitlam and Keating emphasised the importance of high culture. Other than Malcolm Turnbull, nobody does now. There is a strong anti-intellectual flavour in public life, sometimes described as philistine or – more commonly – Bogan, which leads to a reluctance to engage in complex or sophisticated argument and analysis of evidence.

Paradoxically, the age of the Information Revolution, which should have been an instrument of personal liberation and an explosion of creativity, has been characterised by domination of public policy by managerialism, replacement of ‘the public good’ by ‘private benefit’, the decline of sustained critical debate on issues leading to gross oversimplification, trivialisation, the relentless ‘dumbing down’ in mass media, linked with the cult of celebrity, substance abuse and retreat into the realm of the personal, and the rise of fundamentalism and an assault on reason. The Knowledge Revolution ought to have been a countervailing force: in practice it has been the vector of change.

Media – old and new – is partly to blame. Revolutionary changes in IT may be even more important, where we can communicate very rapidly, for example on Twitter, in ways that are shallow and non-reflective. Advocacy and analysis has largely dropped out of politics and been replaced by marketing and sloganeering. Politicians share the blame as well, as consenting adults.

In the film *Wadjda* (2012), the first feature shot entirely in Saudi Arabia, directed by Haifaa al Mansour, a woman, the central character, an eleven year old girl with aspirations towards modernity and individual

expression, has set her heart on acquiring a bicycle, but this proposition arouses fierce opposition. In Saudi Arabia, it appears to be a known fact that girls who ride bicycles are incapable of bearing children. No evidence is provided but the opinion is strongly held. In the end, Wadjda gets her green bike but the difficulties she faced were comparable to those experienced by the director herself.

I have proposed my own variation on Pascal’s celebrated wager on the existence of God, set out in his *Pensées*, and applied it to climate change, as a way of evaluating the risk of global action vs. non-action about reducing greenhouse gas emissions:

- If we take action and disaster is averted, there will be massive avoidance of human suffering.
- If we take action and the climate change problem abates for other reasons, little is lost and the world benefits from a cleaner environment.
- If we fail to act and disaster results, then massive suffering will have been aggravated by stupidity.
- If we do not take action and there is no disaster, the outcome will be due to luck alone, like an idiot winning the lottery.

