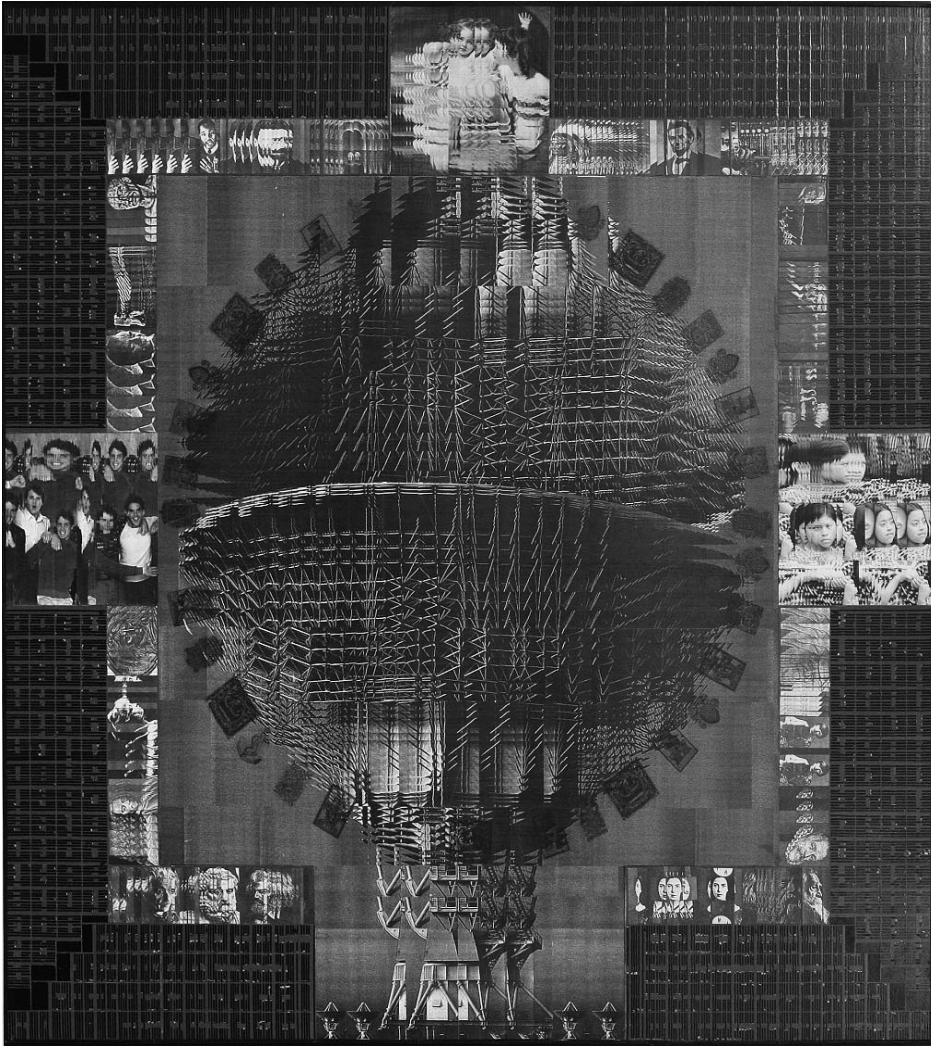


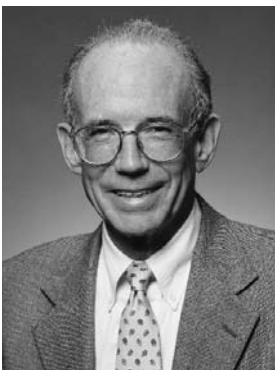
## Science, Policy, and the Media

Donald Kennedy

This presentation was given at the 1923rd Stated Meeting, held at the House of the Academy on February 13, 2008.



Collage by Samuel E. Gallo titled *Media Message People*. The media are symbolized by the spherical center section, which suggests a world interconnected by media networks as complex as the human nervous system. Printers' marks surround the sphere. The human elements are represented in the three square panels at the edges of the collage. Along the outer band, portraits of famous people are accompanied by the people's messages written in a computer code used to translate words into binary numbers. Photo courtesy of University of Oregon School of Journalism and Communication.



### Donald Kennedy

Donald Kennedy is Editor-in-Chief Emeritus of *Science* magazine, and President Emeritus and Bing Professor of Environmental Science and Policy Emeritus at Stanford University. He has been a Fellow of the American Academy since 1968.

Geneva Overholser (University of Southern California) and I have been engaged with a fine group of colleagues in thinking about an old and sometimes difficult topic: the relationship between journalists who report science and scientists who do the science on which they report.

We are not the first group to have tackled this problem, nor do we seriously expect to have the last word on it. We have had wonderfully thoughtful written analyses by some of those involved in the transaction – science journalists like Corey Dean, Boyce Rensberger, and Bob Bazell; scientists like Tom Lovejoy and Dan Schrag; and public information officers like Earl Holland and Rick Borcheldt, who are often found near the center of such exchanges. Our committee has proceeded with some enthusiasm because we think scientific

understanding is a precious resource for society and because we believe the interface for scientific communication can be improved.

Why is this issue worth so much attention? I want to start with the proposition that a broadly spread citizen-understanding of science and technology is a public good, and that we really can't have too much of it. Several arguments support that proposition. First, we are a curious people, equipped with a lively sense of wonder. Knowledge about the natural world should be absolutely on a par with knowledge about the arts and humanities, though unaccountably it is often given second place on the liberal arts menu. Second, in any given year, our democracy has to decide a host of issues that have important scientific and technological content: what to do about climate change, how to or-

ganize human or robotic exploration of space, how to develop a sustainable national energy policy, how to treat the health potential offered by embryonic stem cells, and the like. To vote intelligently, citizens increasingly will require a level of scientific literacy. Finally, we need to develop a layer of committed scientists who will lead the march of discovery, providing the basic research findings that will be the seed corn for the next generation of developments. In making that kind of commitment, young people are often inspired by dramatic research accomplishments – ones that are being made by scientists and interpreted by those who write about the work.

Those are the three legs of the stool that support science in our culture, and they all depend on this singularly important relationship between scientists and science journalists. There are a number of respects in which that relationship is in good health: the best reporters have learned a lot of science, and the best scientists have forged productive relationships with journalists.

## *What is the relationship between journalists who report science and scientists who do the science on which they report?*

Nevertheless, complaints are being heard from both sides – enough to encourage a kind of caricature of misunderstanding. Scientist A complains that the reporter hasn't taken the trouble to get some background on climate change science, and he has to be educated from scratch. After a certain amount of that, the reporter writes a story in which A's view is paired with criticism from a person who denies global warming. "The trouble with these guys," A says, "is that they each have a two-card Rolodex with an IPCC name on one and Fred Singer's name on the other." The journalist might point out that had scientists in this area been both more careful and more understandable in describing the underlying issues to journalists, it would not have been necessary for A to deliver a cram course to a reporter with a short deadline. As for the two contending views, it may be

asking too much for journalists to count the ayes and nays for every issue – although in the climate change case there is some ground for the scientists' complaint.

A second concern revolves around a disturbing question: Is science writing a disappearing culture? Cristine Russell contributed a poignant piece in the journal of the National Association of Science Writers. In it she describes the demise of the science page – in its time a very good one – at *The Baltimore Sun*. The number of sections or departments dedicated to science in major American metropolitan dailies is estimated to have fallen by half over the past ten years, as declining newspaper economics has tightened its grip. Even at *The New York Times*, with its splendid staff of science writers, we fans have watched its excellent Tuesday Science section morph gradually from mostly science to mostly health.

At *Science* we face some interesting choices because we have some of each: a number of very well-trained and careful science writers in our News department, which has sent several of its alumni to *The New York Times* and National Public Radio, and a couple dozen editors who are all well post-PhD in their disciplinary specialties. Every week the two groups meet to decide which of the papers we plan to publish will be covered by the News section, and which, instead, will be covered by a Perspective, written by a scientist recruited by the editorial staff. Blood is never shed on these occasions, but sometimes problems follow. The purpose of the Perspective is to look at the broader field to which the paper contributes; it is written by a scientist who knows the field well and can establish a context for the new findings. If News covers the paper, our writer may ask questions that might challenge the judgment of an editor. It happens occasionally, but we maintain a clear separation: editors don't tell writers who the peer reviewers are, and our writers don't ask editors who ought to be contacted or avoided.

In pondering the understandings and failures of understanding that occur when scientists from, let's call it, the University of Midwest are talking to journalists from, say, the *Capitol Star*, our committee has tried to surface some common themes. The scientist thinks

## *A broadly spread citizen-understanding of science and technology is a public good.*

that her discovery is important, and with great enthusiasm she describes the problem and her experimental solution of it. The journalist, for whom the science beat comprises only a small part of his portfolio, has little knowledge of the context for his interviewee's work and cannot judge its significance.

To check things out, he calls the Public Information Officer (PIO) of the university to get some background. This particular PIO has prepared a press release after discussing the work with the investigator and her colleagues and is able to supply the journalist with what he needs. Part of the release is clearer to the reporter than the investigator had been; being on short deadline he makes use of a paragraph from the release as the lead for his story, but adds additional material he had absorbed from the researcher's account. The story appears the next morning with the headline "U Mid Researcher Finds Gene for Muscular Dystrophy."

The story initiates a brisk conversation between the researcher and the journalist. The former points out that the gene relates to a mouse model of muscular dystrophy, and that what she had actually found was a site on one chromosome that probably contains the gene. The journalist blames the headline writer, pointing out that the text of the story is far more realistic – save perhaps for some modest overreaching in the part of the press release he had quoted, which naturally he blames on the PIO. No one is left entirely happy with the outcome.

I confess that this is not only hypothetical; it is a caricature. But it is a realistic scenario for understanding the roles played by different actors in this complex and challenging relationship.

If it can't be worked out, what have we lost? Public understanding of science, as I said in the beginning, is a major social good. Understandable and inspiring writing about science changes lives: Consider the number of

young men and women whose passion for nature was stirred by Rachel Carson's *Under the Sea Wind* or, much more recently, by David Quammen's *The Song of the Dodo*. Or consider the kids in Los Angeles who started thinking about the cosmos because K.C. Cole's books, based on her *Los Angeles Times* pieces, touched their curiosity. Beyond the value inherent in the creation of an inquiring citizenry, there is another case for public understanding of science. Important social decisions have to be made wherever science and technology have a powerful impact on prospective public policies. Support for those is dependent on voters who can sort out that relationship and evaluate the science.

That, in turn, depends heavily on what the scientists say and how carefully they say it, and on the journalists who record and interpret the outcome for the public. We are working to improve that relationship – not be-

### *Knowledge about the natural world should be absolutely on a par with knowledge about the arts and humanities.*

cause we think it's in trouble, but because we think it is important enough to pay attention to. Since we have arrived at the science-policy junction, I'd like to explore a case in which various forces – some natural, some human – tend to make the move from science to policy difficult.

There is hardly a clearer venue where science is interacting with policy formation than in the case of climate change and what to do about it. The Intergovernmental Panel on Climate Change (IPCC), a joint project begun twenty years ago as a collaboration between the United Nations and the World Meteorological Organization, has assembled a large body of the best climate scientists from around the world. Their reports contain not only information on the status of the science – drawing on atmospheric physics, oceanography, paleoclimatology, and other disciplines – but also sections on adaptation and mitigation strategies from groups that include econ-

omists and other social scientists. In each year in which the IPCC reports, there is a summary for policy-makers in which the IPCC conclusions are tested against official views of national governments and others to produce a consensus document that may be marginally more cautious than the views of the scientists. That nuance of process, well understood in the climate change science community, may be lost in published accounts of IPCC findings.

The general conclusions relate the increase in average global temperature already experienced – about 0.7 degrees Celsius – to the increase in greenhouse gases (especially CO<sub>2</sub>, which has risen from a preindustrial level of 280 ppm/v to the present 385 ppm/v) that have resulted from human activity. The conclusions are also firm in supporting the use, for projection, of general circulation models that predict a gradual increase in average global temperature, reaching somewhere around 2.5 to 7.0 degrees Celsius by the end of the century, accompanied by a sea level rise of 20 to 82 centimeters and an increase in the frequency of extreme weather events. A small number of scientists in the field disagree with the IPCC consensus. Some believe that the consensus understates the rise in sea level. Others deny its more general conclusions, and are joined and sometimes supported by interests that do not wish to see a strong regulatory policy outcome that will have significant economic consequences.

A journalist following this story has to deal with a number of circumstances. First, it is a big story: an overwhelming majority of the American public now believes that climate change is a major problem and poses a serious threat to our future. So the question of who is right about the science is a big, important question. Second, she will encounter well-credentialed scientists who have deeply held, even passionate, views on the subject. Most will be strong advocates for the IPCC-consensus and wonder why a journalist would consider another view. Others, fewer in number, will cite histories of natural fluctuations in world climate, or challenge the utility of the models, or point to other work that, in their view, makes the scientific position on global warming “controversial.”

Under those circumstances many good reporters will consider it fair and reasonable

### *To vote intelligently, citizens increasingly will require a level of scientific literacy.*

to discuss the matter with several people on each side. No problem there. But the IPCC consensus involves hundreds of scientists, and its conclusions all rest on research published in peer-reviewed journals. Historian of science Naomi Oreskes, at the University of California at San Diego, analyzed the consensus on climate change in this way four years ago; the 2008 consensus is far stronger:

In its most recent assessment, IPCC states unequivocally that the consensus of scientific opinion is that Earth's climate is being affected by human activities: “Human activities . . . are modifying the concentration of atmospheric constituents . . . that absorb or scatter radiant energy . . . [M]ost of the observed warming over the last 50 years is likely to have been due to the increase in greenhouse gas concentrations . . .”<sup>1</sup>

IPCC is not alone in its conclusions. In recent years, all major scientific bodies in the United States whose members' expertise bears directly on the matter have issued similar statements. For example, the National Academy of Sciences report, *Climate Change Science: An Analysis of Some Key Questions*, begins: “Greenhouse gases are accumulating in Earth's atmosphere as a result of human activities, causing surface air temperatures and subsurface ocean temperatures to rise.” The report explicitly asks whether the IPCC assessment is a fair summary of professional scientific thinking, and answers yes: “The IPCC's conclusion that most of the observed warming of the last 50 years is likely to have been due to the increase in greenhouse gas concentrations accurately reflects the current thinking of the scientific community on this issue.”

The drafting of such reports and statements involves many opportunities for comment, criticism, and revision, and it is not likely that they would diverge greatly from the opinions of the societies' mem-

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<sup>1</sup>Naomi Oreskes, “The Scientific Consensus on Climate Change,” *Science* 306 (2004): 1686.

bers. Nevertheless, they might downplay legitimate dissenting opinions. That hypothesis was tested by analyzing 98 abstracts, published in refereed scientific journals between 1993 and 2003, and listed in the ISI database with the keywords “climate change.”

The 928 papers were divided into six categories: explicit endorsement of the consensus position, evaluation of impacts, mitigation proposals, methods, paleoclimate analysis, and rejection of the consensus position. Of all the papers, 75% fell into the first three categories, either explicitly or implicitly accepting the consensus view; 25% dealt with methods of paleoclimate, taking no position on current anthropogenic climate change. Remarkably, none of the papers disagreed with the consensus position.

In fact, I count today about six scientists who regularly appear in opposition to the consensus, and most of them do not publish original research. If the reporter has a short deadline, she may resort to one or two on each side. When this happens in the climate change arena, most people in the research community are horrified.

## *Is science writing a disappearing culture?*

What should the poor reporter do? She should be concerned about two important attributes of scientists. The first is their qualifications: the journals they have published in and other credentials, including invited articles; membership in scientific societies and academies; and support from agencies that award grants on the basis of peer review – indeed, information of the kind she might get by taking advantage of such sources as Oreskes indicated.

The second concerns possible financial conflicts of interest: a reporter could ask hard questions about whether the scientist is getting financial support and from whom. In this case certain energy companies and foundations – the Competitive Enterprise Institute, the Heritage Foundation, and the George C. Marshall Institute – have all supported scientists who actively publish critiques of the IPCC consensus. Support from those sources

might raise questions that would not arise from a National Science Foundation grant.

There is another criterion. Is there evidence of a more organized agenda? Oreskes has studied, as has Robert Porter, the development of a particular strategy on the part of those who dispute the evidence for global warming. Early contacts were made between these individuals and others, including scientists, who challenged the epidemiological consensus on the relationship between smoking and lung cancer. The common theme of both campaigns, which the climate group learned from the tobacco scientists, is that one should “teach the controversy” – that is, present the underlying science as unclear because there are scientists who have surfaced disagreements with the consensus. When that controversy is abetted by support from particular industries or foundations, money enters the picture again.

Of course, here is a danger in using guilt by association; conflict of interest or prospect of financial gain is very different from the matter of scientific competence. At *Science* we make authors declare all their support, and where any of it might suggest to the reader that a potential conflict might exist, we publish that information. But our determination of the paper’s scientific merit is conducted independent of that, and we don’t think the two should be confused. Some reporters are apt to make it a proxy for serious judgments about competence, and that may mislead the reader.

Neil Munro, a Washington investigative reporter who works for *National Journal* off and on, warns reporters to include outside financial sources when writing about academic researchers. For example, in a piece called “Doctor Who?” in *Washington Monthly*, he compares two biologists who work on stem cells. Dr. David Prentice of Indiana State University believes that all the medical promise of stem cell research can be met with adult stem cells; on the other side, Dr. Irving Weissman of Stanford University is a partisan for the use of embryonic stem cells. “Part of the explanation, of course, is simply an honest difference of opinion among scientists,” Munro says. But he then goes on to elaborate the financial advantages Prentice might gain from a biotech company he hopes to found, and the fact that Weissman has “made

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millions” in companies using stem cell technology. He points out that neither man has kept his affiliations a secret; his objection is to the press, which invariably refers to Weissman as “a biologist from Stanford.”

What interests me is Munro’s role as a reporter. He takes care of a significant difference of opinion by explaining it in terms of financial interest and ignores evidence of a stark difference in competence. Weissman has published numerous articles in top-tier peer-reviewed journals, and is widely regarded as an innovative leader in cell biology. He is a member of the National Academy of Science (not merely a chair of one panel, the distinction Munro allows him), and a recipient of a number of prizes and awards. Prentice has no peer-reviewed publications; his website refers to a letter in *Science*, which was unreviewed and soon followed by a letter from three distinguished scientists contesting nearly every claim Prentice had made. All of this information was readily available.

Munro’s advice to reporters, to disclose financial relationships, is good advice. It would have been better had it been accompanied by an admonition to follow the credentials as well as the money.

I have touched upon two of the matters that might figure in the debate about science that many of us hope will take place before the primary races get to the convention stage. Climate change and the stem cell debate are this year’s poster children for scientific issues that converge with public policy, and of course that means that they’re political. In each case, federal action has failed to fol-

low public preference; the result has been a down-migration of jurisdiction – with states passing referenda to support stem cell research, California pushing its own emissions standards, and mayors organizing to reduce the carbon footprints of their cities. This interesting development ought to get more press than it does.

So should another problem: a growing scientific suspicion about the number of “fixes” now making their appearance in the climate-energy space. Biofuels, especially corn-derived ethanol, are not regarded by most scientists as workable – either economically or as carbon-sparing once every cost is in. An equal skepticism is attending the number of “carbon offsets” being made available to households, industries, or even individuals who have taken on a sense of obligation to reduce their carbon footprints. There are doubtless offsets that actually do achieve a carbon-neutralization effect – but these are rare and do not include random acts of tree-planting, or the fertilization of bits of ocean with nutrients that might produce blooms of phytoplankton.

*An overwhelming majority of the American public now believes that climate change is a major problem and poses a serious threat to our future.*

So far I have been emphasizing things journalists might do to create a more balanced and knowledgeable account of science for the public. But it would be foolish as well as unfair to put the entire burden on the press. Scientists need to do much more of the work themselves: by learning to speak more clearly about what they’re doing, by getting out into the real world to talk more directly to the public, and by taking care to be scientifically sound and rigorous as they connect their own work to public policy.

A number of incentives make all this difficult to achieve. Scientists being trained in one of the iconic PhD-granting departments are seldom urged to work on their communica-

tion skills. Too many of their mentors are interested exclusively in their progress toward completion of a dissertation; a joke current in molecular biology is that they are determined to create clonal offspring. It is a commonly heard instruction to graduate students that instead of undertaking a course involving some kind of outreach, they should focus on the thesis. I once asked Bob Berdahl, the thoughtful president of the Association of American Universities, if it might be possible to find out how many science departments in universities that belong to the AAU offered seminars or courses on how to discuss science with the media or the public. He said he’d try, but predicted that the answer would be few or none.

The picture isn’t actually quite that bleak. The Pew Foundation has sponsored some efforts of that kind, and the highly successful Aldo Leopold program has been coaching and teaching young scientists about media relations for some years. The best institutional Public Information Officers help their science faculties make press contacts, and often work to improve the clarity of communication between the two. But discouragingly little is happening at the great research universities, as Berdahl warns. Even worse then for a graduate student to be told – “That’s a waste of your time; stick to your thesis” – is for his colleagues to warn him about the dangers of being “Saganized” – that is, to become popular enough as an explainer of science to risk the contempt of more serious researchers, a contempt that owes more than a little to envy.

A final problem that needs some discussion concerns resource concentration. The influential national media – concentrated heavily in the Boston-New York-Washington area – pay much more attention to science than do daily newspapers elsewhere, let alone cable television and talk radio. It is a natural consequence that some merging takes place between science and the media in these areas of higher concentration. It is hardly an accident that Corey Dean of *The New York Times* and Dan Schrag at Harvard are involved in a seminar that accomplishes just such a merger, nor is it surprising that Andy Revkin of the *Times* consults regularly at Harvard and Stanford about climate change science. In the long run, we are going to have to ex-

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tend the business of relationship-making to some more disparate, less comfortable situations, in which we reach the majority of Americans with institutions and people and technologies we haven’t yet connected. I wish I were a better example of what can be done, but I’m as limited as many of the rest of you. I hope the young scientist in the Leopold program and the young science writer from the *San Jose Mercury News* will be able to show us the way. ■

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