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work. Others, testing his theory, have since found that narrative factors also play a role. Because science is so often communicated through the media, which relies on narratives, science itself is not enough to sustain a story over time. Beyond results, political and economic controversy can eventually take over for the reporting of "raw" data and conclusions. Also, if the predicted consequences do not materialize soon, that which the media had sensationally predicted may come to be seen as a foolish whipping up of hysteria. Finally, vested interests that may wish to downplay scientific findings can also influence the media reporting of the issue.

Public relations effects and industry-sponsored science can also be brought forth to question the validity of scientific claims. Thus, while climate change has been on the public and media agenda since the late 1980s, attention has waxed and waned over the years, as various forces have contributed to a confusing picture and ultimately a lack of public pressure for concrete action on the issue. In sum, even if scientists wanted to ignore the role that narratives play in how the public understands and acts on scientific issues, they could and should not. Scientists, under this view, need to pay more attention to how issues will be framed by journalists and received by the public. If they do not, their research, even when solid and valid, may go unnoticed by the public, or policymakers may be able to frame the issues in ways that meet political or economic needs.

Another issue involving narrative is the area of "risk communication." This is the communication of information about hazards from scientists and policymakers to publics. The science community would prefer to rely on a technical/rational form of discourse, in which hazards and risks are communicated precisely—mathematically—to relevant audiences. However, publics do not necessarily understand risk in the same way as scientists. Often the public will see something as more risky if it is out of their control or if there is more "dread" associated with the risk. Oftentimes, in the various forums in which scientists present risk information to publics, there is a fundamental disconnection between the ways the two parties perceive the interchange. While scientists may feel that they have done their job if they give an accurate statistical account of the chances of an individual being harmed, citizens may feel that they are being duped, especially if they see the process and procedure as being unbalanced, biased, or unfair. That is, while scientists may think that their "expert" stance is what is needed, citizens may well discount scientists' presentations as attempts to get them to acquiesce to a policy that has already been decided. Scientists often see such reactions as illogical or uninformed, but there is often no way around the fact that people will use a narrative logic (as described by Fisher) in reaching their conclusions. Additionally, because the media often present science in narrative packages, it is often the case that publics have received more than just the scientific findings. The media will also have focused on controversy among scientists (even if only a few disagree with the consensus view), as well as on the political and economic aspects of the controversy.

While "pure" scientific discourse would probably eschew what we normally think of as narrative, it is evident that narrative is inscribed within all aspects of the science communication process, from production of science to its reporting and reception by audiences. While communication researchers are seeking ways to improve the commensurability of communication between scientists and the public, this search is ongoing.

James Shanahan

See also Deficit Model; Discourse Analysis and Science; Kuhn, Thomas; Rhetoric of Science; Risk Communication, Overview

Further Readings

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Miller, S. (2001). Public understanding of science at the crossroads. *Public Understanding of Science, 10*(1), 115–120.

National Academies, U.S.

The National Academies are a conglomerate of four nonprofit honorary societies of distinguished scholars engaged in scientific and engineering research and dedicated to the advancement of science and technology and to their use for the general welfare. The first of those institutions was the National Academy of Sciences, established by President Abraham Lincoln in 1863. To keep pace with the growing role that science and technology would play in public life, the National Academies later also incorporated the National Research Council (established in 1916), the National Academy of Engineering (1964), and the Institute of Medicine (1970). The name National Academies now refers to these four institutions collectively. Because of the organization's stature, reports and other publications of the National Academies and its National Research Council, which address a broad range of topics in science policy and science education, are influential; their conclusions and findings appear regularly in the news.

The National Academy of Sciences (NAS) was chartered to look into and report on any subject whenever called on to do so by any branch of government. It has about 2,100 members and 380 foreign associates, including nearly 200 Nobel Prize winners. The academy is governed by a council consisting of 12 members (councilors) and 5 officers, who are elected from among the academy's membership.

The National Academy of Engineering (NAE) provides engineering leadership by focusing on projects that address the relationships among engineering, technology, and the quality of life. The NAE also conducts independent studies to examine important topics in engineering and technology. The NAE has more than 2,000 members and foreign associates, senior professionals in business, academia, and government, who are among the world's most accomplished engineers.

The Institute of Medicine (IOM) has as its main mission to serve as adviser to the nation on strategies to improve health, and it does so by providing scientific advice on matters of biomedical science, medicine, and general health. It has nearly 1,700 members, of which about 80 are foreign associates.

The National Research Council (NRC) functions under the auspices of the three other National Academies mentioned previously and can be considered the operating arm of those academies. The mission of the NRC is to improve government decision making and public policy, increase public education and understanding, and promote the acquisition and dissemination of knowledge in matters involving science, engineering, technology, and health by providing advice to elected officials, policymakers, and the public in general. The NRC is administered jointly by the NAS, NAE, and the IOM through the NRC Governing Board. The NRC also administers a number of fellowships.

Each of the academies is a nonprofit organization composed of members elected by their peers. Being a member of any of these academies is one of the highest honors bestowed on an individual in a scientific, engineering, or medical profession; election represents recognition of an outstanding sustained record of accomplishments in one's field.

Each of the National Academies organizes its work through committees of individuals who volunteer their time and effort in projects aimed at addressing critical national issues by giving expert advice to the federal government and the public. Historically, the results of the committees' deliberations have guided policy decisions in many different areas of science, technology, and education. Both Congress and the executive branch have used their advice, both in establishing legislation and in issuing executive orders. Yet all of the academies work outside the formal framework of government to ensure the provision of both scientifically and technically informed analysis and independent direction.

None of the four institutions that compose the National Academies receives direct federal appropriations for its work. Individual projects may be funded by federal agencies, foundations, other governmental and private sources, or the institution's own endowment. The work is made possible by the participation of the nearly 6,000 of the world's top scientists, engineers, and other professionals who are members of the National Academies.

The academies' committee reports must go through a rigorous peer-review process at the academy level as well as at the NRC level. Each report must be based on solid evidence, supplemented in many cases by expert opinion. The committees that prepare these reports are made up of those experts appropriate to the topics to be discussed. Membership on these committees is determined as the result of a complex process: soliciting and receiving nominations for candidates from a wide number of sources, presenting a proposed slate and alternatives to the academy leadership group, receiving approval from the academy president, and then formally requesting appointment from the NRC chairperson. The selection process is designed to make sure that there are no particular biases or potential conflicts of interest involving the composition of the committees.

The committee meetings convened may take place either in public or in private. During the information-gathering phase of the committee work, members may hear from those who are not committee members or employees, officials, or agents of the academy in question. These meetings are generally open to the public, while the deliberations (involving discussion of the specific findings or recommendations to be included in a report) usually take place in private. This is aimed at avoiding bias in the deliberations that might otherwise result from public pressure and also allows committee members to change their positions freely during the course of the deliberations.

The entire process is usually aimed at achieving a consensus among members of the committee. Where the published data are insufficient to support a conclusion, the committee may use its collective knowledge alongside available data to argue for its conclusions. Once an NAS report draft is finished, it is reviewed according to the policies of the academy in question and also by the NRC Report Review Committee (RRC). Reviews are provided to the study staff by the review office and are blinded. The study staff must respond to each review, either by making appropriate changes or providing a rationale for not doing so, prior to the document's becoming finalized.

Aldemaro Romero

See also Issues in Science and Technology; Royal Society

Further Readings

The National Academies: Advisors to the Nation on Science, Engineering, and Medicine: www.nationalacademies.org

National Aeronautics and Space Administration, U.S.

The National Aeronautics and Space Administration (NASA) is an independent agency within the government of the United States, having a mission to pioneer future space exploration, scientific discovery, and aeronautics research. It is led by an administrator who is appointed by the president and confirmed by the U.S. Senate, and within Congress the agency reports to the Senate Committee on Commerce, Science and Transportation and to the House Committee on Science and Technology. NASA's accomplishments are often in the news; the agency distributes extensive information about its activities to the media and other audiences via its Web site, including press kits and fact sheets; it operates its own cable television channel, NASA TV, in some markets; and it broadcasts NASA news on the full range of new media technologies, from podcasts to Twitter.

Following World War II, the U.S. Department of Defense (DoD) began a serious push into the fields of rocketry and upper stratosphere science. Aircraft research was performed both by DoD and by the National Advisory Committee for Aeronautics (NACA). Largely due to Soviet space successes such as the *Sputnik* satellite, President Dwight D. Eisenhower called for a renewed focus on space science. The first successful space missions, launches of suborbital satellites of the Jupiter series, were by the DoD. Suborbital satellite *Jupiter* C RS-40, which was launched on August 8, 1957, provided the first nose cone ever to be recovered following entry into space. On January 31, 1958, suborbital satellite *Jupiter* C RS-29 was launched containing the *Explorer I* payload; the first scientific experiment in space, it measured radiation. The architect of the *Explorer I* payload was Professor James Van Allen of the University of Iowa, and the Van Allen Radiation Belt was named in his honor.

President Eisenhower, in calling for orbital satellite research, mandated that this effort be undertaken by a civilian, rather than a military, organization. On October 1, 1958, following the passage of the National Aeronautics and Space Act, NASA absorbed NACA with its 8,000 employees,