

SELLING SCIENCE

When scientists attempt to use the press to promote their work, and science reporters rely more on imagery than on substance, the public winds up with an idealized and alienating view of the scientific enterprise.

Dorothy Nelkin

In 1987, scientists at the spring meeting of The American Physical Society announced the development of new, high-temperature superconducting materials. The session, which had been widely publicized through early preprints and press releases, was attended by 3500 physicists and hundreds of reporters. Bertram Batlogg from the Bell Laboratories solid-state research team proclaimed, "Our life has changed." An ecstatic press headlined Batlogg's comment, and underneath heralded "breathtaking advances," "stunning possibilities" and "revolution." Journalists reported "gasps" from scientists; high- T_c superconductivity was "a quantum leap in technology," a "new frontier." News articles anticipated new transportation (levitated trains), new power systems (cheap energy) and the creation of an "Oxide Valley" comparable to California's Silicon Valley.

The extravagant claims for high-temperature superconductivity are typical of the reporting of science and technology. Recall the early days of nuclear power—"too cheap to meter"—when reporters were predicting automobiles and heating systems run by atomic piles, and even artificial suns that would control the weather: "No baseball games will be called off on account of rain in an era of atomic energy. No airplane will bypass an airport because of fog. No city will experience a winter traffic jam because of snow." Recall the reporting on the space shuttle before the Challenger accident: "an airline service to the heavens"; an opportunity for profitable new manufacturing facilities "in the weightless void"; "the ultimate technology park."

At this time of concern about the public support of science and the implications of declining science literacy,

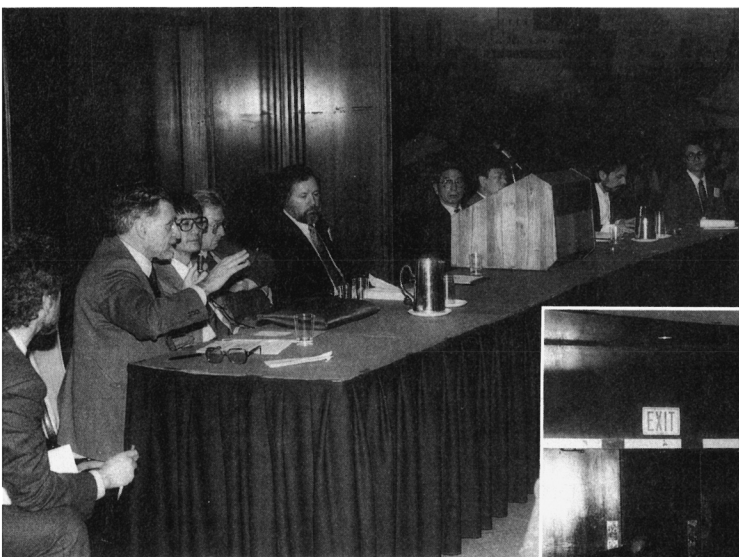
scientists and their institutions are actively publicizing—at times to the point of hype—their research and its potential social benefits. And usually the press responds. Yet scientists frequently regard the press, like politics, as a "dirty" business that threatens the purity of science and contributes to antisience attitudes. Some professional journals have offered advice to scientists on defensive tactics to adopt when questioned by reporters: taping the interviews, and even engaging in deliberate obfuscation. "Visible scientists" like Carl Sagan or Linus Pauling, who seek to popularize their fields and their work, are often viewed by colleagues as a sort of pollution. And while some seek out publicity, many scientists refuse to talk to journalists at all.

What lies at the source of the tension between journalists and scientists? Why does it persist even with the growing interest in the media as a route toward creating an informed citizenry? I analyzed the coverage of science in the press to find out how it reflects both the constraints of journalism and the efforts of scientists to create a positive public image.¹ I concentrated on the popular press, including not only national newspapers and magazines such as *The New York Times* and *Newsweek* but also local newspapers and widely distributed specialized publications such as women's, health and business magazines. (My analysis excluded specialized science magazines like *Science* and *Scientific American*, since they are directed to an audience already informed, engaged and interested in scientific and technical subjects.) I also interviewed reporters and scientists, and attended meetings and press conferences. My study revealed a pattern of problems—some arising from the peculiar difficulties of science reporting, others endemic to American journalism in general.

Imagery and idealization

For most people the reality of science is what they read in the press. They understand science less through direct experience or past education than through the filter of

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AMERICAN INSTITUTE OF PHYSICS

Scientists meet the press the day after the "Woodstock of physics"—the packed session on high- T_c superconducting oxides at the 1987 APS March meeting. Explaining the new findings to attentive reporters are (seated at table, left to right) Alex Müller, Paul C. W. Chu, Philip W. Anderson, M. Brian Maple, Shoji Tanaka, Zhongxian Zhao, Robert Cava and Koichi Kitazawa.



journalistic language and imagery. And despite the differences between local papers, with few specialized reporters, and national papers such as *The New York Times*, which employ stables of experienced writers who know the science terrain, news reports on science tend to focus on the same issues, cite the same sources and interpret information in similar terms.

While the reports may vary in depth and detail, there is remarkable consistency in the imagery of science writing in the press. Several metaphorical clusters recur. One is the language of alchemy: Scientists are magicians, miracle workers, wizards, discovering ultimate truths, secret knowledge, magic bullets. Increasingly prevalent is the aggressive imagery of warfare, revolution and frontier: Scientists are pioneers or warriors battling disease, conquering natural forces or competing against the Japanese. They are engaged in revolution—a computer revolution, a biotechnology revolution, a revolution in the generation of energy. The focus is often on dramatic "breakthroughs," be they new superconducting materials, patented mice, the fastest computers to date or the latest medical cure. Science is also portrayed in the press as a solution for intractable dilemmas, a means of achieving certainty in an uncertain world, a way to mobilize consensus and rebuild comfortable images of progress and national leadership.

Even critical science writing can convey this idealistic tone. Journalists describe incidents of fraud, for example, less as a reflection of structural problems within science than as the pathological behavior of aberrant individuals. While consumer fraud is reported as a rip-off, scientific

fraud is a betrayal, a waste, a scandal that tarnishes and taints scientific institutions. Religious metaphors are common: Scientists who deceive have "succumbed to temptation"; fraud is a "scientific sin." This language idealizes science as a pure and awe-inspiring activity, an almost spiritual calling.

That scientists may have personal economic goals is reported as a new and distressing problem. *Time* described with alarm "Hertz rent-a-scientists." News reports suggest that scientists these days must choose between "profit and purity," as though the economic influence on science is a new dilemma. Again, the pervasive image is of a disinterested, pure science, above political or economic bias.

Descriptions of Nobel laureates often reinforce this ideal. They are "superstars" at the "frontier," helping us control the future through science. Most articles on laureates describe their work only in enough detail to suggest it is arcane. Rather than the substance of the research, the issue most frequently covered is the relative numbers of US and foreign prizewinners. The reports sound strangely similar to reports on the Olympics: "another strong US show"; "the winning American style"; "we tied a record set in 1972."

The laureates themselves are mostly drawn as isolated, removed and more than slightly above the rest of humanity. A striking exception has been the few women laureates, who are described as "just like you and me." In *McCall's* magazine, Maria Mayer was "a brilliant scientist, her children are perfectly darling, and she is so darn pretty that it all seems unfair." She saw everything

"through the starry eyes of a romantic woman." By likening the nucleus to the layers of an onion in her shell model, she explained the atom in "a feminine way." The coverage of Rosalind Yalow in *Family Health* focused not on her work but on her balancing career and family—and on her clothes. Headline: "She Cooks, She Cleans, She Wins the Nobel Prize." The reader discovers in the first line of a *New York Times* feature on Barbara McClintock that she bakes with walnuts. In treating these women as remarkable for their ordinariness, such reports only strengthen the prevailing image of science as an arcane and superior—not to mention male—profession.

Relatively little appears in the press on the methods and social organization of research, or on the priorities involved in major science policy decisions. Information that would help the reader understand the nature of scientific evidence and the difference between science and unverified opinion is similarly scarce. In the effort to personalize science the scientist becomes a star, distorting the actual structure of research, which depends as well on the anonymous work of technicians, students or young PhDs. In the effort to mystify science it becomes a collection of arcane facts beyond the sphere of public understanding. And in the effort to promote research, it becomes a set of "promising breakthroughs," ultimately fostering disillusionment when promises fail. Interferon, for example, evolved in the press of the early 1980s from "wonder therapy" to "wallflower," from "magic bullet" to "false hope." Paradoxically, this type of press coverage alienates the very audience it is presumably trying to inform, promoting public apathy, a sense of impotence and

the ubiquitous tendency to defer to expertise.

The metaphors of science journalism are also important because they have implications for public policy. When high technology is associated with "frontiers" that are maintained through "battles" or "struggles," the imagery of war implies that the experts should not be questioned, that new technologies must go forward and that limits are inappropriate. But if instead the imagery suggests crisis or technology out of control, then we feel we ought to seek ways to rein in the runaway forces through increased government regulation and control. Calling the weakness of science education "a problem of educational policy" implies the need for considered, long-term policy intervention; defining it as a "national crisis" suggests an urgent, if short-term, response. If science is portrayed as incredibly complex and arcane, and the scientist as a kind of magician or priest, this implies that the appropriate public attitude is one of reverence and awe. But if science and scientists are simply another interest group seeking its share of public resources, this seems to call for critical public evaluation.

The roots of professional science journalism

The images of science in the press reflect the history of science writing, amplified by recent efforts of scientists to hype their work in order to create a positive public image. Around the turn of the century, popular magazines conveyed the awe of science in almost mystical terms. Scientists appeared as detached, remote, omniscient. *The Nation*, in 1902, chided the press for fostering an image of science as a "black art" of magic and wizardry.

The role of science during World War I and the postwar proliferation of consumer goods brought greater public awareness of the social and economic power of science. At the same time, people perceived the widening gap in knowledge between experts and laymen as a serious dilemma. In 1919 *The New York Times* published a series of editorials on the difficulty of comprehending new developments in physics and the disturbing implications for democracy when important intellectual achievements



Economic competitiveness forms the "frame" for much reporting on technology and science, even when it is basic or theoretical. A recent issue of *Fortune* features "America's hot young scientists" who "give the US an edge in the race for global advantage" (among them astronomer Alan Dressler, shown on the cover).

are understood by only a handful of people. Einstein's theory of relativity became a symbol of scientific obscurity. His friend Morris Cohen stated the dilemma in the *Times*: "Free civilization means that everyone's reason is competent to explore the facts of nature for himself, but the recent development of science means a return to the artificial barriers between the uninitiated laymen and the initiated expert."

In the context of this concern, newspaper magnate Edward W. Scripps founded Science Service in 1921 as the first American syndicate for the distribution of news about science. Scripps believed that scientists were "so blamed wise and so packed full of knowledge... that they cannot comprehend why God has made nearly all the rest of mankind so infernally stupid." He believed that science was the basis of the democratic way of life. And above all, he believed that given the enormous social and technological changes of the period, science news would surely sell.

Early in the formation of Science Service, Scripps pondered whether it should act as a press agent for the scientific associations or as an independent news service. While hoping to avoid simply disseminating propaganda, he chose the former role. The syndicate was controlled by trustees from the most prominent science associations, and its editorial policies were dominated by the values of the scientific community.

The first editor of Science Service, chemist Edwin

Slosson, established a style that became an important precedent for subsequent science writing. He found that "it is not the rule but the exception to the rule that attracts public attention. The public that we are trying to reach in the daily press is in the cultural stage when three-headed cows, Siamese twins and bearded ladies draw the crowd to the sideshows." That was why, he explained, science was usually reported in short paragraphs, ending in "-est": "the fastest or the slowest, the hottest or the coldest, the biggest or the smallest, and in any case, the newest thing in the world."

Slosson, accordingly, emphasized human interest in his attempt to compete for readers. Advertisements for the service announced that "drama and romance are interwoven with wondrous facts, helpful facts" and that "drama lurks in every test tube." Science Service articles cast scientists as pioneers: "The pure thrill of primal discovery comes only to the explorer who first crosses the crest of the mountain range that divides the unknown from the known." Shaped both by perceptions of public tastes and by the values and concerns of the scientific community, Science Service created a market for science news and set the purpose and the style of contemporary science journalism.

In the 1930s science journalism began to expand and professionalize with the formation of the National Association of Science Writers. But when journalists began to communicate science to the public more systematically, their relationship with scientists suffered. Scientists, using academic standards to evaluate media performance, accused science writers of sensationalism and oversimplification. The writers in turn castigated scientists as remote and unwilling to see things from the public's point of view.

Public relations and its pitfalls

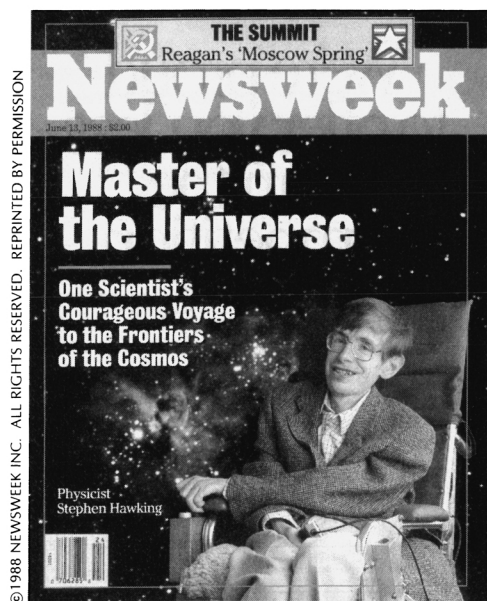
As the scientific enterprise grew in organizational complexity and social importance in the early 1970s, its relationship with the media changed. Scientists began to discuss the media as a means to convince people of the benefits of science so as to win public support. But in seeking influence over their public image, scientists also attracted censure from reporters, who have long been skeptical about public relations. Science became a target of more critical journalistic investigation during the 1970s, in keeping with the post-Watergate preoccupation with corruption in American institutions. Leading science writers like David Perlman of the *San Francisco Chronicle* faulted their colleagues for failing to treat science as they would any other institution, especially politics: "We are in the business to report on the activities of the house of science, not to protect it, just as political writers report on politics and politicians."

In the 1980s, however, the tone of press coverage once



Style-setter for science journalism, chemist Edwin Slosson was the first editor of Science Service. Slosson tried to catch the reader's attention by emphasizing human interest in stories put out by the pioneering science news syndicate.

The scientist as superstar. A 1988 *Newsweek* cover describes Stephen Hawking as a "master of the universe" embarked on a "courageous voyage to the frontiers of the cosmos." Seeking to personalize science, the press often focuses on individual researchers, obscuring the collective and collaborative nature of much scientific effort.



again changed, reflecting both the temper of the times and more organized efforts by scientific institutions to attract favorable press attention. When science was expanding in the 1960s, scientists enjoyed robust research budgets and a legitimacy based upon the unquestioned association between science and progress. By the 1980s they were drawn into baffling social, ethical and political dilemmas. While perceived as a national resource, science confronted politically unstable funding just at a time when large-scale projects—the Human Genome Project, the Superconducting Super Collider, supercomputers, the Moon-Mars initiative, the space station—were all competing for massive public funding. Dependent more on political choices than peer review, many scientists in the 1980s became convinced that scholarly communication was no longer sufficient to assure support for their costly enterprise, that national visibility through the mass media was strategically essential. They greatly expanded their efforts to work the media, trying to shape the images conveyed. In a *New York Times* interview, Nobel laureate physicist Kenneth Wilson described his strategy for gaining government support for supercomputer research: "The substance of it all is too complicated to get across—it's the image that is important. The image of this computer program as the key to our technological leadership is what drives the interplay between people like ourselves and the media and forces a reaction from Congressmen."

Accordingly, universities and professional societies have developed sophisticated public relations techniques, publishing glossy reports, holding press conferences and mailing press releases about research findings—sometimes before those findings are peer-reviewed. When scientists at the University of Utah rushed to claim the accomplishment of cold fusion, the press of course responded, even though it appeared to be an extreme example of press-conference science. Once again reporters were predicting a revolution in the generation of energy and even a "Fusion Valley" that would become the economic mecca of scientific progress.

While many scientists were highly critical of this use of the media, cold fusion has not been the only case of overzealous behavior. Hoping to establish priority and to attract public and, therefore, Congressional or industrial support, scientists have gone directly to the press to promote cures for Alzheimer's disease, treatments for anorexia, therapies for AIDS. Some have described their work for public consumption in terms that might embarrass the *National Enquirer*. Geneticists promoting the Human Genome Project have called it "the quest for the Holy Grail" and promised no less than the "prevention of disease." Scientists promoting estrogen replacement therapy promised "a new era of youth for aging females." An artificial intelligence scientist wrote that with the new generation of computers "revolution, transformation and salvation are all to be carried out." And a supercomputer advocate has claimed that the new technology will bring about "a second Renaissance."

Exacerbating this trend is the involvement of more and more scientists in research close to commercial interests. In "revolutionary" areas of biotechnology and energy, patents and profits are at stake. The press becomes a means of promotion, a way for scientists to sell their expertise and accomplishments in a competitive knowledge market.

Journalists are suspicious of the increased public relations in science. As one reporter put it, "They're all grinding the same axe, from breakthrough university to wonder pharmaceuticals to the National Institute of Nearly Cured Diseases." Editors complain that newspapers are becoming pawns for grantsmanship. But looking for dramatic stories and pressed for time, most journalists are vulnerable to the information and the language of their sources. They are inclined to rely on public relations professionals who facilitate their job.

Moreover, many science writers regard scientists with wonder and awe. As one journalist told me, "When I work on a story I get to sit at the feet of the most luminous minds in the US." Expecting scientists to be a neutral, disinterested source of information, they tend to be uncritical of the material packaged by scientific institutions, especially when it is presented in manageable and efficient form. Thus, reporting on science tends to be positive—even promotional—until, of course, the promises fail.

The Challenger accident revealed the pitfalls of relying on organizational PR and identifying too closely with one's sources and subject matter. The space program had been important to the development of science journalism as a profession, and for years reporters had generally accepted the information provided by NASA's sophisticated public relations apparatus. After the accident, an angry press felt betrayed. *Newsweek* announced that "the news media and NASA, wedded by mutual interest from the earliest days of the space program, are in the midst of a messy divorce." Having suddenly lost faith in the veracity of NASA, some newspapers engaged in electronic war games, using high-technology interception antennas and experimental laser cameras to get stories about the recovery of the shuttle that NASA wanted to conceal. The press was filled with self-recrimination, as reporters accused themselves of accepting "spoon-fed news," of ignoring the safety problems of NASA by focusing only on the launches, of "treating the shuttle like a running photo opportunity" and of letting readers down.

"Some agencies have a public affairs office," a writer in *The New York Times* commented bitterly; "NASA is a public affairs office that has an agency."

What's news—and when?

In light of the generally positive image of science in the press, why do scientists remain so critical of journalists? Why are "visible scientists" so often seen by their scientific colleagues as a threat? To understand the persistence of tension between scientists and journalists, let me turn to some fundamental differences between the two professions.

To begin with, scientists and journalists often differ in their judgments about *what is news*. In the scientific community research findings are provisional, and therefore not newsworthy, until certified by peers to fit into the existing framework of knowledge. However, for journalists, especially at daily newspapers, the interest lies in new and dramatic, though possibly tentative and even aberrant, research. Time pressures and the need to find an "angle" that will define their writing as news cause them to focus on controversy, competition and "breaking news." They are more than willing to dramatize research like cold fusion before it becomes "old news." This approach limits analysis of the methods and processes of science. It leads to neglect of long-term consequences and of progress not associated with striking single events. And it conceals the continuity of science, as media attention wanes after initial dramatic episodes. Although many scientists actively contribute to the "breakthrough" syndrome, ideally they prefer to emphasize continuity and the cumulative nature of research.

A second set of tensions occur over *when to release information* to the public. In the case of suspected risk, how much evidence is necessary? How certain must the evidence be? In the case of new discoveries, how much scientific consensus must there be before research findings are widely reported? Views on these questions vary. Most journalists believe that data should be promptly available to the public. But scientists prefer to withhold information until data are interpreted, validated and assessed for their significance.

Further conflict follows from different *notions of objectivity*. The journalist's norm of objectivity—the belief that verity can be established by balanced presentation of different points of view—is very often a source of irritation to scientists involved in news stories. This notion of objectivity is meaningless in the scientific community: "Fairness" and "equal time" are not relevant to the understanding of nature; scientific standards of objectivity require instead empirical verification of claims. Ironically, the aspiration toward objectivity in the American press had its roots in the growing influence in the 19th century of the scientific attitude that facts, standing high above the distorting influence of interests and pressure, can and should be distinguished from values. Prior to the 1830s an openly partisan "party press" dominated newspaper publishing.

The tensions are exacerbated by different assumptions about *appropriate styles of communication*. Constrained by the interests and backgrounds of their readers, journalists must select and simplify technical information. This often precludes the documentation, nuanced positions and precautionary qualifications that scientists feel are necessary to present their work accurately. Indeed, journalists may see scientists who make qualified remarks as having something to hide. What is oversimplification to the scientist may be readability in the eyes of the journalist. Many accusations of inaccuracy, in fact, follow less from actual errors than from efforts to present

complex material in a readable and appealing style.

Scientists direct their professional communication to an audience trained in their discipline. They can take for granted that their readers share certain assumptions and will assimilate the information in predictable ways. Thus they often forget that some words may have special meanings in a scientific context and may be interpreted quite differently by the lay reader. Take the word "evidence." Confusion over its definition is a frequent source of misunderstanding. Biostatisticians use the word "evidence" as a statistical concept; biomedical researchers also define the critical experiment as evidence; while most lay people, including journalists, accept as evidence anecdotal information or individual cases. While scientists talk of aggregate data, reporters address readers' immediate concerns—such questions as whether to eliminate saccharin from their diets.

Finally, the most important source of strain between scientists and journalists is the question of *the appropriate role of the press*. Scientists often talk about the press as a conduit or pipeline responsible for transporting science to the public in an easily understood form. Confusing their special interests with general questions about the responsibility of the press, they are reluctant to tolerate coverage of the limits or flaws of science. Regarding the press as a means of furthering scientific goals, they expect to control the flow of information to the public just as they do within their own domain. When their views are disputed, they feel betrayed.

Science writers themselves are ambivalent about their role. There is a minimal amount of probing investigation, bold interpretation and critical inquiry in science journalism. While the press publishes criticism of art, theatre, music and literature, science is usually spared. While political writers aim to analyze and criticize, science writers seek to elucidate and explain. While political reporters go beyond press briefings to probe the stories behind the news, science writers rely on scientific authorities, press conferences and professional journals. And they are reluctant to challenge their sources—in part for fear of losing access to them. A *New York Times* reporter who switched from science to politics said: "I feel a lot freer covering politics than I ever did covering science. . . . It is very difficult [for science writers] not to be on the team. I am allowed to say things about the President, using my basic instincts as a journalist. That you just wouldn't think of doing in science."

Science can be portrayed in the press as an activity of an esoteric elite or as an integral part of social life, as an uncontrollable endeavor or as the result of conscious choice. Given the importance of science in society, it should be the focus of careful and critical investigative journalism. The public would be better served if both scientists and reporters encouraged a spirit of critical inquiry in science journalism. The purpose of science journalism, after all, is not to promote science but to help create an informed citizenry aware of the social, political and economic implications of scientific activities, the nature of evidence underlying decisions, and the limits as well as the power of science as applied to human affairs.

Reference

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