
SCIENCE ON TELEVISION: How It Affects Public Conceptions

George Gerbner

PROLOGUE: *To say that public support for science ebbs and flows is to misrepresent the depth of popular ambivalence and anxiety about scientists and what they do. When science is not being blamed for threatening the very existence of the globe, it is accused of despoiling nature and dehumanizing mankind with technology.*

Television, the most powerful medium ever developed, cannot be held totally responsible for public mistrust and misunderstanding of science, but it is not entirely blameless. As communications specialist George Gerbner points out in this article, television entertainment programming encourages hostile public conceptions of science in important ways.

Scientists and the leaders of the scientific community should address this hostility, says Gerbner. In an age when a single episode on prime-time television can reach more people than all science and technology promotional efforts put together, scientists must forget their aversion to the mass media and seek stronger ties with those who write, produce, and direct television news and entertainment programs.

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U.S. citizens encounter science and technology most often on television, and not on documentaries like "Nova" but through watching prime-time entertainment.

We live in a scientific age. Yet cults, superstitions, pseudoscience, and hostility to science and technology are widespread and even show signs of new virulence. The giant conglomerate Procter & Gamble abandoned its 103-year-old trademark, an art-deco-style face of the "man in the moon," after spending over \$100 million on public relations in a vain attempt to dispel rumors that it was the mark of the Devil and promoted Satan worship. Creationists pressured at least two states to pass laws to teach "creation science" and some textbook suppliers to alter their treatment of evolution. Surveys show that only one in ten adults can provide a minimally acceptable definition of the meaning of scientific study; nearly one-third agree that "AIDS is a punishment God has given homosexuals for the way they live"; and nearly half believe that astrology is scientific.

Clearly, the reasons for contemporary obscurantism and misanthropy are many and complex. But their existence cannot be blamed on any information lag or gap. We live in an information-rich environment. Even illiteracy or isolation pose no barrier to the most pervasive source of information: television.

Science is a way of thinking and communicating that can both liberate and dominate. It can confer power on those who use it and devastate those who cannot. Its images and symbols inspire feelings of confidence and apprehension, authority and resistance, control and being controlled.

Communicators who deal with this ambivalence toward science do not have a simple task. The popular market for science (in contrast to the specialized market of users who know what they need) is a mixture of great expectations, fears, utilitarian interests, curiosities, ancient prejudices, and superstitions. Mass media appeal to all of these.

Under a grant from the National Science Foundation, my colleagues Larry Gross, Michael Morgan, and Nancy Signorielli and I assessed the portrayal of science and scientists on prime-time television and analyzed survey data to discover what contributions television and other media make to conceptions of science held by different groups of viewers. From our ongoing research project, called Cultural Indicators, we know that most U.S. citizens encounter science and technology most often on television. We also know that most of these encounters occur not through watching informative documentaries like "Nova"; they occur through watching prime-time entertainment. Let me sketch the existing cultural context before I summarize what viewers see on prime-time television and what they learn from it.

Science journalism caters to the most upscale information seeker. The field is dominated by a few dozen veteran reporters and their favorite contacts and sources. Although science news comprises only 1 percent of all news in daily newspapers (puzzles and horoscopes claim three times as much), science magazine publishing boomed in the late 1970s.

Publishers had reason to be optimistic. "After all," the trade paper *Advertising Age* reported on October 18, 1984, "the nation's 25-to-40-year-olds—that high-profile demographic—had been reared on space walks, friendly computers, and organ transplants. As a group they were mostly well educated and had a more than passing interest in the problems of pollution, fuel shortages, and things nuclear." However, space walks, organ transplants, and things nuclear also gave rise to fearful visions.

Social researchers found, however, that being well informed results in greater wariness about science. The controversies surrounding fluoridation

and nuclear power reflected a pattern of initial hope that turned to fear of the risks involved and of being manipulated and losing control. Researchers also found that new bursts of collective apprehension, energized by media stories about asbestos, animal experimentation, gene manipulation, and widespread pollutants, fueled anxieties about unrestrained science and technology.

Today these patterns mingle with alarmist sensationalism that appeals to three social types: those who hold the miracles and terrors of science in almost religious awe; those who have little use for or access to the bounties of science; and those who look at science with suspicion and mistrust. Curtis D. MacDougall's book, *Superstition and the Press*, details how newspapers carry reports on doomsday prophecies, exorcism, sea serpents and monsters, faith healers, psychics, gurus, subliminal persuasion, creationism, UFOs, and pseudoscientific cults and practices of all kinds.

This is the cultural context in which television plays its pivotal role. Unlike other media, television is used relatively nonselectively. The set is on daily in the typical U.S. home for an average of more than seven hours. It provides an abundance of information, mostly through entertainment, to all viewers, including those who seek no information. Television reaches the previously unreachable quickly and continuously.

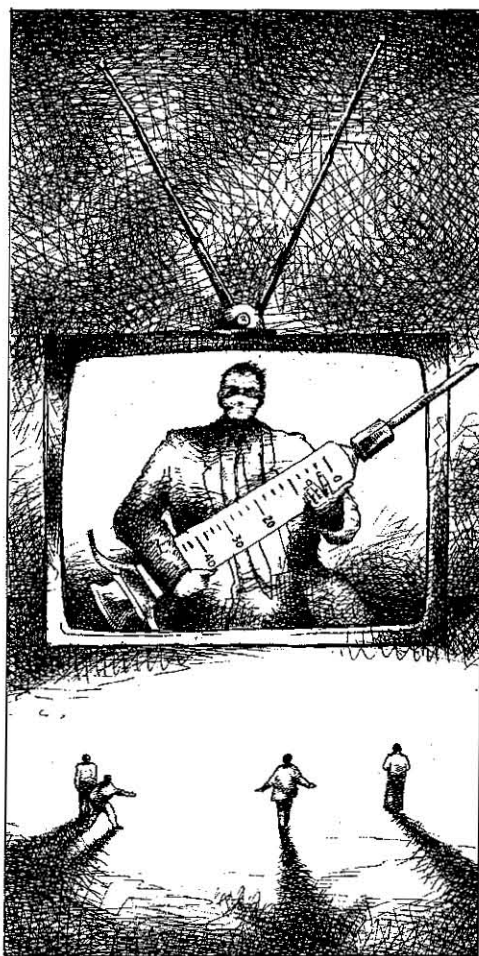
To attract and sell to the largest audience at the least cost to the advertiser (the source of broadcaster income), television must cultivate the most common interests, hopes, and fears of the largest groups of viewers. These imperatives define television's role in society, guide its functions, and shape its contributions to public conceptions of science.

Our study of what viewers see was based on a detailed analysis of a 10-year sample of network prime-time dramatic programs telecast between 1973 and 1983. A sample week from each season, stored in the Cultural Indicators archive, showed 174 programs in which science, technology, or medicine were major themes, 410 programs in which they were minor themes, and 252 programs with no such themes.

The images of science and technology, including medicine, appear in 7 out of every 10 prime-time dramatic programs. In addition to news and occasional documentaries, the average prime-time viewer will see a dozen doctors and two other scientists each week.

Science and technology dominate all programs set in the future and are most likely to be featured in fast-moving globe-trotting adventure. Television doctors are among the most positively portrayed characters appearing on prime time. But other scientists, while on the whole positively presented, have a greater share of ambivalent and troublesome portrayals. They are a bit older and "stranger" than other professionals and are more likely to be foreigners. For every villainous scientist in a major role, there are five who are virtuous. But, for every "bad" doctor, there are 19 "good"; for every "bad" law enforcer, there are 40 "good."

This relative imbalance in the aggregate image of television scientists is also reflected in their success rate. For every scientist in a major role who fails, two succeed. But for every doctor who fails, five succeed, and for every law enforcer who fails, eight succeed. One reason for the higher rate of failure might be that about 5 percent of the scientists portrayed on television kill someone and 10 percent get killed. That is the highest victimization rate of



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all occupational groups on prime-time television, including the army, police, and private investigators.

Scientific work on television is not all bad and certainly not "mad." Our trained analysts found that scientists were portrayed as stronger and smarter than other professionals and that they were quite rational. But of all occupational groups on television, scientists were observed as among the least sociable. They were the most likely to work alone and to hold jobs they considered "very important." Overall, they presented a negative image in comparison to doctors and other professionals, though not in absolute terms. And the image was somewhat foreboding, touched with a sense of evil, trouble, and peril.

Are the images of science on television reflected in the ideas and behaviors of viewers? To answer this question, our study used what we call cultivation analysis. This involves the examination of response patterns of light and heavy viewers, controlling for other demographic and media variables. The differences (if any) between the responses of light and heavy viewers indicate whether television makes an independent contribution to viewer conceptions. (There is no absolute measure of a "heavy viewer." The term designates the upper half of any distribution of amounts of viewing or correlations with amounts of viewing.) Our analysis was based on a telephone survey of a representative sample of 1,631 respondents conducted for us by the Public Opinion Laboratory of Northern Illinois University.

We combined the responses to five items into an index reflecting general orientations toward science. The items asked respondents to agree or disagree with propositions that science makes our way of life change too fast; makes our lives healthier, easier, and more comfortable; breaks down people's ideas of right and wrong; is more likely to cause problems than to find solutions; and that the growth of science means that a few people can control our lives.

We constructed a high versus low version of the index and analyzed the proportion of light, medium, and heavy television viewers holding positive orientations toward science. We determined the percentage of positive responses to science in two groups divided by sex and by education. The pattern that emerges—heavy viewers are less likely than light viewers to be favorable about science—appears in groups divided by age, extent of newspaper reading, extent of viewing science documentaries on PBS, and extent of reading science magazines. The largest differences are in those groups whose light viewers are by far the most positive towards science.

In other words, exposure to science and technology through television entertainment appears to cultivate a generally less favorable orientation toward science, especially among higher status groups whose light-viewer members are its greatest supporters. Lower status groups have a generally low opinion of science, which television viewing only seems to confirm. Another pattern that emerges is one we call "mainstreaming": a relative similarity in outlooks reflecting greater exposure to the common mass ritual of television that overrides the influence of other important social factors. The result is that most group differences are larger among light than among heavy viewers.

Reading science magazines and watching science documentaries on

television make a difference. Those who do (or even just read newspapers) are more likely to score high on the index of positive orientation. But mainstreaming is evident: the heavy-viewing science readers and watchers are still less positive than their light-viewing counterparts. Seeking out science documentaries or science magazines is a sign of more positive orientation, but heavy television viewing appears to counterbalance that positive tendency.

This basic pattern recurs, with some variations, in the responses to other questions. The more people watch television the less favorable they are about science, especially in groups (such as those who went to college) whose light viewers are the most favorable toward science. Some groups (such as older and lower-status respondents) are in the less favorable or more critical television mainstream. For them, viewing makes little difference. Reading and viewing nonfictional science materials relate to a generally more positive orientation toward science but do not prevent erosion of that view among heavy viewers. The cultivation of relatively critical and negative views and the blending of all views into the television mainstream are the usual correlates of viewing.

Respondents were asked to agree or disagree that scientists do dangerous work; don't get much fun out of life; usually don't get married; if married, don't spend much time with their families; are apt to be odd and peculiar; are apt to be foreigners; are not likely to be religious; have few interests outside their work; are mainly interested in knowledge for its own sake and don't care much for its practical value. These items were combined into another index, showing television's contributions to the images of scientists held by different groups of viewers.

As before, in most comparisons television viewing is associated with a less positive view of scientists. In no case do heavy viewers within a particular group express views that are more positive, although in some instances (those age 55 and older, nonwhites, those with greater interest in religion), heavy and light viewers are equally negative. Again, groups whose light viewers are the least likely to offer positive views of scientists seem to be most in tune with the television mainstream. Reading science magazines and watching science documentaries raise the percentage of positive responses among light viewers but again yield to the mainstreaming pattern.

We combined the responses from six questions to create a factor-based index reflecting orientations towards technological innovation. The first of these questions noted, "These days, more and more things that people used to do are done by machines. Do you think that's a good thing or a bad thing?" The other five questions were addressed to specific technological developments, each to be labeled by respondents as good, a little of both, or bad. The technological developments included computers, industrial robots, electronic bank tellers, nuclear power plants, and video games. Overall, and in every subgroup, television viewing is associated with a less positive view of the new technologies.

We created an index from four items that were shown by factor analysis to reflect a desire to place restrictions on scientists' activities. Using this index we asked respondents whether they thought scientists should or should not be allowed to conduct studies that could enable people to live to be 100 or more; could allow scientists to create new forms of animal and plant life; could discover intelligent beings in outer space; and could allow parents to select the sex of their child.

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The index revealed a consistent relationship to television viewing, with heavy viewers showing more willingness to place restrictions on science. Mainstreaming is evident in most groups. Among the light-viewing respondents with some college education, for example, we find only 28 percent scoring high on this index, compared with 54 percent of the less educated light viewers. This difference of 26 percentage points compares with a difference of only 8 points between the heavy viewers of the two groups.

Dramatic images involve characters in action. We have seen that scientists in the world of television tend to be a bit older and stranger, are more ambiguous than most other characters, and lead lives that are more isolated and perilous. Are these images reflected in the ideas of viewers?

Respondents were asked to agree or disagree with the propositions that scientists are odd and peculiar people, that their work is dangerous, that they have few interests but work, that they spend little time with their families. We also asked them to rate the job of a scientist compared to "most other jobs." The results are similar to those we have seen before.

The more people watch television, the more they think that scientists are odd and peculiar. This is especially pronounced among males, nonwhites, those who do not watch science documentaries or read science magazines, and those who have a high interest in religion. The cultivation of a sense of danger in science is most striking among the higher status and younger viewers. Heavy viewers in most groups are more likely than light viewers to respond that scientists have few interests except work and that they spend little time with their families. Predictably, fewer heavy than light viewers believe that science jobs are better than most.

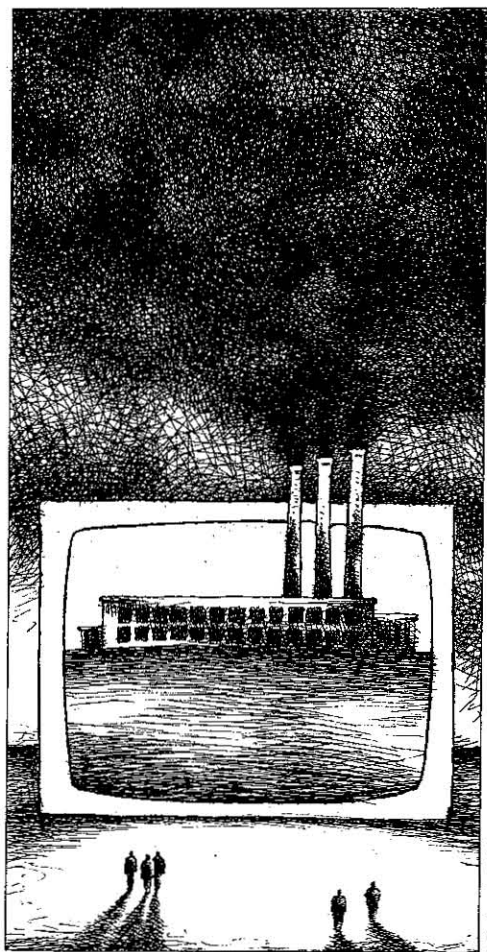
The final results deal with critical attitudes related to science. Does it make life change too fast? Pose more of a threat than a promise? What about nuclear energy? Space exploration?

The results show that most groups of heavy viewers believe that science makes life change too fast. Viewing also tends to enhance anxiety and erode or inhibit appreciation of the benefits of science. This is especially significant among groups that are otherwise the most supportive, such as those who are college educated, have higher incomes, and read science magazines.

Although most people disagree with the statement that science causes more problems than solutions, fewer heavy than light viewers do so, again, especially in groups otherwise most supportive. One of those problems may be nuclear power plants; heavy viewers in all subgroups are more critical of them. Space exploration is also in disfavor; almost all groups of heavy viewers would spend less money on it.

In sum, prime-time television drama presents a steady stream of generally positive images and messages about science and scientists but they are less positive than the images and messages about other professions. Moreover, television drama tends to reflect and exacerbate public ambivalence and anxiety about science.

Television's contribution to popular conceptions of science and scientists blends with other social and cultural influences into a mainstream that tends to be more critical and negative than the views of comparable groups that watch less television. Foreboding images of odd and perilous activity seem to heighten fears, strengthen the desire for restraints, and inhibit the inclination for science as an occupation or an area of public participation. Reading science magazines and watching documentary programs about science make a significant positive contribution. However, even this does



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not completely overcome the steady cultivation of relatively critical and negative public conceptions, especially among those who are otherwise the most supportive of science. In other words, science readers and science documentary viewers have more positive images than do other groups, but television viewing tends to erode these images and bring heavy-viewing science readers and documentary viewers closer to the others.

Television did not invent the negative image of science. It only streamlines the image, puts it on the assembly line, and delivers it into every home. The image of science on television is only part of a broader problem: the skewed image television presents of the world. Television works well delivering to the advertiser the largest number of viewers at the least cost, but it does not necessarily do well at enlightening those viewers.

Television's portrayal of science deserves more focused attention by leaders in science, the community of scientists, and legislators. There is no quick or easy fix. The excellent information services of organizations such as the American Association for the Advancement of Science and the Scientists' Institute for Public Information make information available mostly to news media. Science writing programs, science museums, and more specialized science and technology promotional efforts are useful, but they are necessarily limited to those who elect to attend or seek information. Yet a single episode on a popular prime-time program, or even a soap opera, reaches more people than all the other educational efforts put together. More important, television reaches those who receive no other information about science. The task is to make realistic information and imagery (not just flattery) not only available but inescapable. That means constant liaison with those who write, produce, and direct television programs of all sorts, especially dramatic series.

Academics often shun media opportunities because they know that they cannot control the content and context of what is presented or because of a misplaced distaste of "popularizing." The media, on the other hand, will always find the experts they need and feed the fears and anxieties in which the media seem to have a vested interest. Scientists seeking to make a contribution to public conceptions via media must accept a trade-off. They may lose something in transit, but increased visibility and public stature can be used to command more attention and to gain more opportunities to appear in contexts that they can control better.

Universities are increasingly turning to courses and programs in critical viewing or media analysis as an essential part of a general liberal education. Networks are increasingly concerned that the pendulum has swung so far in the direction of deregulation that, having dismantled many public protections against excessive and exploitive commercialism, they have become vulnerable to new legislative scrutiny when the pendulum starts swinging the other way. Senate bill 2323, introduced by Sen. Paul Simon (D-Ill.), would exempt the networks from the threat of antitrust prosecution if they agreed to restore parts of their old abandoned industry code, and especially if they ameliorate the corrosive effects of television mayhem (in which fictional scientists have more than their share).

Finally, a science media coordinating council to plan strategy, streamline national media liaison activities, and organize meetings with network executives and the handful of writers and directors who create most programs, would go a long way to synchronize other activities, reduce duplication, and avoid media projects working at cross purposes. ■

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