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Telling the People: Science in the Public Press since the Second World War

B. Dixon

In April, 1974, science journalists from nine European countries (Austria, Belgium, France, Great Britain, Italy, the Netherlands, Spain, Switzerland and the Federal Republic of Germany) met in Salzburg to consider their role in the modern world. Convened under the auspices of the newly formed European Union of Associations of Science Journalists (EUASJ), the conference was the first event of its sort ever held. One outcome was the following 'Salzburg declaration':

Science and technology increasingly determine the lifestyle and development of society.

At the same time, the gap between science and the public is widening. Research is becoming more and more cut off, from lay people, who hardly know the consequences that may follow; from politicians, who have to take science policy decisions; even from scientists, who are often confined to extremely specialised fields.

Science and technology, however, are essential to survival; problems such as famine, the energy shortage, the population explosion, traffic and environmental hazards cannot be solved without their help. Most people get their knowledge mainly through the mass media. Consequently, the totality of scientific information which they need must be diffused through the press, radio, television and other media.

Science popularisation is not sufficient. The size and costs of the scientific enterprise today, and its potential for good or bad, oblige the science journalist to be the observer, interpreter and critic of scientific developments and their political causes and consequences. In our modern world the science journalist must also collaborate with the scientist and politician.

The interpretation of science journalism set out in the last paragraph contrasts strikingly with that expressed by Lord Zuckerman in his 1971 Times Literary Supplement lectures. In the course of those lectures, Zuckerman suggested that science correspondents existed simply to pass on, by accurate precise, the views and findings of research workers. He argued that 'they are essentially reporters, any two of whom would be expected – one might suppose – to give essentially the same picture of the printed words of some scientific or technical publication which they might be writing, however different their views might be about the significance of the facts ... one does not expect them to behave like art critics, who might take differing views of the quality of a new exhibition of paintings or sculpture' (Zuckerman, 1971).
These conflicting views illuminate a major change that has occurred since the last world war in what most science writers believe to be their obligations in their work — a shift which parallels greatly increased social and political concern over science. That change can be symbolised by the circumstances in which J.G. Crowther, the first science correspondent ever engaged by a national newspaper in Britain, left the then Manchester Guardian in 1945 because he wanted to write not only about the technical aspects of newly proved nuclear weapons but also about the political problems they had created. The editor of the Manchester Guardian did not wish to cover the subject that way.

True, as Crowther himself has pointed out (Crowther, 1972), another pioneer science journalist, Ritchie Calder (now Lord Ritchie Calder), had used the nutritional researches of Dr. John Boyd Orr to illustrate the effects of unemployment and deprivation on men, women and children during the industrial recession of the 1920s. Crowther, too, had written about what he termed the 'planned application of science and technology' to the development of the U.S.S.R. But the prevailing note of prewar science coverage in the press, not only in Britain, but elsewhere in Europe, and in the United States, was 'straight', interpretative science, with only occasional regard for its social or political ramifications. Even the Marxist biologist, J.B.S. Haldane, who contributed regular pieces to the Communist newspaper, the Daily Worker, was for the most part content to explain biology, chemistry and physics to his readers, rather than crusade over related and consequent political issues.

Another considerable development in science journalism over the past four decades is illustrated by the rapid rise in membership of the National Association of Science Writers (NASW) in the United States. There, as elsewhere, science writing was virtually an unknown specialty until the 1930s. Then, in 1934, David Dietz (science editor of Scripps Howard Newspapers), William Lawrence of the New York Times and Robert Potter of the New York Herald Tribune decided to set up the NASW. By 1938 the original membership of 11 had grown to only 28, but by 1945 it totalled 61. By 1963 there were 200 members, and today about double that number. The Association of British Science Writers, formed with a handful of people in 1947, now has a membership of 180. Corresponding bodies have been established in Europe and have expanded at a similar rate. This culminated in the setting up in 1972 of the EUASJ, which now has some 900 members. Although some members of these cadres are solely concerned with science as a source of offbeat stories, or as what Nigel Calder (1973) terms 'intellectual entertainments', most of them nowadays spend their time investigating and writing about the social, political and commercial relations of science.

Surprisingly, in view of this growth in the profession of science writing, and its changing emphasis, there have been comparatively few studies quantifying the amount of science published in newspapers or analysing its content. One of the few substantial surveys is that of Ruth Davies and Leslie Sklar (1974; cf. Sklar, 1974), who examined the coverage of scientific and technological topics in four British newspapers over the period 1949-1969. Davies and Sklar compared the contents of the Daily Mirror, The Times, the Daily Express and the London Evening Standard in February 1949, February 1959, and February 1969. A major finding was that the total numbers of column inches devoted to science in the Daily Mirror was 257 in February 1949, 469 in 1959, and 913 in 1969. The corresponding figures for The Times were 314, 1089 and 3327. For the Daily Express they were 262, 550 and 782, and those for the Evening Standard were 197, 330 and 615. Davies and Sklar concluded that science coverage increased substantially over the 20-year period — though less handsomely when examined in relation to the overall growth in news coverage. Of particular interest historically is their categorisation of the style in which newspaper stories were written. They expressed changes in the content of stories over the two decades as percentages of different types of material, and found that, while 'explanatory' content dwindled slightly from 33% to 31%, the 'reassuring' content increased from 8 to 19%, while 'relevance to experts' declined from 19 to 7%. This appears to confirm the view that science correspondents have begun to play a more active role, adding their own gloss to stories rather than simply purveying the views of learned authorities. That trend has probably been reinforced in the decade since the cut-off point in Davies and Sklar's survey.

Evidence from the United States suggests that science has increased markedly in the U.S. press since the last war. In 1951 the NASW and the New York University Department of Journalism circulated editors with questions about their coverage. Nearly two-thirds of the 50 who replied (63%) said they had at least doubled the amount of space given to science news over the previous ten years, while eleven (22%) claimed a 50% increase. Only two (8%) reported that there had been no change (Kriegshaum, 1967).

One of the most recent studies designed to probe further into newspaper treatment of science is that of Greta Jones et al. (1978). Their findings for British newspapers extended earlier reports published in France, Canada, and the U.S.A. showing that the better educated, and people in higher occupational groups, have a greater knowledge of science than those in other social groups. Jones and her colleagues analysed the content of three nation's (The Times, Daily Mirror and Daily Express) and one local paper (the Leicester Mercury) over a total of three months, (made up of days chosen at random between October 1975 and June 1976). Overall, they found that 75% of the items concerned medicine (including human biology). Six per cent were behavioural science; 5% engineering/technology; 4% virology; 3% space science; 3% earth science; and 1% each of physics, chemistry, general (science policy, etc.) and unclassified (science fiction, etc.). When broken down according to newspaper, however, the figures underlined what the French, Canadian and American surveys showed: the more popular the newspaper, the greater the proportion of items devoted to biomedical
topics (The Times 71%, the Daily Mirror 78%, the Daily Express 87%). This survey also suggested, as did Davies and Sklar's work, that more popular newspapers make less science available to their readers.

Jones et al. confirm that British newspapers are greatly concerned with the context and implications of science. 'Only eight per cent of the items we examined could be classified as pure exposition of scientific information unrelated to societal activity. The remainder were associated with some issue of social, as well as scientific, relevance. These issues included especially medical politics, the ethics of medical or scientific research, nuclear power and energy.'

One sense in which the United Kingdom press compares unfavourably with major newspapers in the rest of Europe is the comparative rarity of science features - articles of a thousand words, or more, which allow the writer space to marshall arguments around a complex, contentious issue and/or to explain in detail the background to a new scientific breakthrough. On 15 August, 1978, for example, after physicists at Princeton University had announced progress towards controlled thermonuclear fusion, the Netherlands daily De Volkskrant carried a half-page feature outlining the work and its associated problems, complete with a helpful diagram to assist the reader's understanding. De Volkskrant publishes a regular science page with material of this sort, as do Die Zeit and the Frankfurter Allgemeine Zeitung in Germany. In France, Le Monde takes science very seriously, issuing supplements on the subject twice a month, while Le Matin runs one science page out of 32 almost every day. Science coverage on this scale, which is paralleled by that of the New York Times and the Washington Post in the U.S.A., is virtually unknown in Britain - with the occasional exception of The Financial Times and items that now appear in The Guardian's 'Features' section, launched in September 1979. It is significant, though, that even the distinguished science editor of The Financial Times, David Fischlock (1974), can claim only that in Britain 'at its best the reporting of science compares favourably with that of such countries as the United States, West Germany or Sweden'.

It is worth observing at this point, that, whereas U.K. national papers have one science correspondent apiece, this is by no means true elsewhere. Le Monde and the New York Times each have a staff of ten science writers. The Washington Post employs three and the Boston Globe four. We should also remember that, since the last war, some elements of what were formerly part of the science writer's brief have become specialties in their own right. Many newspapers, for example, now employ journalists to handle topics such as environment and energy. This expansion can, perhaps, be illustrated by developments at the New York Times, which, since November 1978, has begun to produce a separate section of the paper devoted entirely to science. Dunwoody (1978) has recently analysed the factors affecting the selection of news items at a scientific meeting. Peer interaction with other science writers seems to be an important influence in formulating decisions.

Let us now turn to some case histories, illustrating the style of science reporting over the past few decades. First, news of atomic energy as it has been presented to the American public. The development of nuclear power in the 1950s and early 1960s was portrayed in the U.S. press in glowing terms. Nuclear power was to be a great panacea, performing cheaply, safely and cleanly functions formerly carried out by power stations based on fossil fuels, with their accompaniments of filth and high social costs. Questions of safety, possible dangers to either employees of the nuclear industry or the public at large, were seldom raised. This highly favourable picture was presented by an alliance of the Atomic Energy Commission (AEC), its press officers with their press releases, and enthusiastic journalists who cooperated most willingly. Then, almost overnight, nuclear reactors became highly controversial, and such was the ferocity of public campaigns against the atomic energy programme by public interest bodies that even some of the AEC's own critics began to suspect that criticism was going too far.

An important part of the explanation for this turn of events was given by Peter Metzger (1975), science editor of Rocky Mountain News, in Denver, Colorado, when he spoke at a conference held in Los Angeles by the Atomic Industrial Forum. 'Today, gentlemen, you are reaping the whirlwind', Dr. Metzger told the group of delegates from the nuclear industry. 'The whirlwind was sown not by your enemies, but by those whom you doubtless conceived as your friends, by none other than the most fanatical proponents of nuclear energy.' The trouble began, Metzger argued, in the late 1960s, when citizen started asking perfectly proper questions and were treated with disrespect by Holifield's joint committee and a poppa-knows-best attitude by Seaborg's AEC and a combination of the two by the nuclear industry. 'At about the same time, newspaper reporters, who formerly had believed every word put out by the AEC, realised that they had frequently been misled, and so began to assume instead that every statement issued by the Commission was untrustworthy. Metzger concluded: 'Those same incompetent science writers the atomic industry PR people loved all those years because they were printing everything old Mr. Atom told them, are writing today just as irresponsible stuff, only it's against the nuclear industry this time round. What you are seeing is just the other side of the same old familiar coin you learned to love all those years.'

The 'incompetence' referred to here is not that of the journalist who deals inaccurately with his material. It is broader than that. The failure is incompetence of judgement, the mindless retailing of information without any attempt to check the security of its foundations by perceptive questioning. One of the best examples on record of the importance of such critical examination is contained in a paper by Nicholas Wade (1970), where he shows how careful probing by journalists caused three prominent American cancer researchers to modify loose and misleading remarks that would otherwise have resulted in needless alarmist reports about breast cancer. Speaking at a National Academy of Sciences press conference, Dr. Sol Spiegelman reported that he and a colleague had found virus-
like particles in the breast milk of nursing mothers with a family history of breast cancer. He went on to say: ‘if a woman has a familial history of breast cancer ... and if she shows virus particles, and if she were my sister, I would tell her not to nurse the child.’

The New York Times reported the research, and Spiegelman’s warning, adding, ‘he and other scientists emphasised, however, that the particles had not been proved to be viruses related to the cause of breast cancer in humans’. The New York Daily News pointed out that ‘there is no definite proof that the suspected virus causes breast cancer. Even if the milk agent does cause breast cancer, there is no definite proof that transmission of the particle in human milk is responsible.’ And the Associated Press agency reported: ‘A Columbia University cancer researcher said Tuesday new findings suggest a conceivable though wholly unproven danger that some breast-nursing mothers may transmit a potential for breast cancer to their female babies.’ As Wade’s account of the press conference clearly shows, these prudent cautions resulted from the well-informed and persistent questioning of reporters, rather than from the initial announcement by Spiegelman and his colleagues.

A detailed analysis of the way in which the press handled another major scientific event is that by David Rubin and Val Hendy (1977), who monitored coverage of the swine influenza immunisation campaign in the U.S.A. in 1976. The episode began with the apparent discovery of so-called swine flu (the cause of the 1918 pandemic) among young recruits at Fort Dix in early 1976, and President Ford’s subsequent plan to vaccinate all 200 million American citizens against the disease. The New York Times covered the events thoroughly. During the week when the immunisation campaign began in earnest, October 11–17, it carried 320 column inches on the programme, spread among 15 substantial stories. This may be compared with the Casper Star Tribune’s 4 pieces totalling 63 column inches and the Denver Post’s 6 stories (61 column inches). The New York Times coverage was comprehensive, including the scientific, medical, political, and commercial aspects of the situation. Many of the other publications performed less well. Of the nine regional papers that Rubin and Hendy singled out for particular attention only two, during that critical week, told their readers what swine influenza was. Only three explained the nature of the vaccine and only one raised the question (widely debated afterwards) of the relationship of the immunisation drive to Mr. Ford’s election campaign. A single paper commented on the vaccine’s efficacy, whilst only three of the nine drew parallels with the 1918 pandemic. By accident or design, not one of them gave space to ‘non-medical establishment viewpoints’.

Overall, Rubin and Hendy concluded that press coverage was superficial and marked by a ‘buddy count’ mentality — though it was rarely inaccurate or sensational. One reason for this seems to have been the sequence of events after two people died in Pittsburgh following influenza immunisation. A report appeared in the Pittsburgh Post-Gazette late on 11 October. Two days later the science corres-
spondent of The Pittsburgh Press learned that another three elderly people, who had died, had been given the same vaccine. The paper carried an account of this, together with the information that the vaccine had been distributed to clinics in other states. ‘At this point’, Rubin and Hendy write, ‘if the Center for Disease Control had moved decisively to explain the deaths and stay on top of developments nationally, confusion might have been averted. But since the CDC showed a poor sense of public relations and was unprepared to deal with the national press, the wires became the chief source of information about vaccine-related deaths all over the country. They flashed the news of such deaths from city to city and created the appearance of a plague. The wires gave an anxious public the numbers not forthcoming from the CDC. The story began to snowball simply by virtue of the way the wires work — rewriting local newspapers and interconnecting cities by teletype’. A better understanding by doctors and medical scientists of how the press works, Rubin and Hendy suggest, could improve coverage of similar situations in future. They also argue that, ‘most reporters were not equipped to ask basic questions about the vaccine’ — and that this is why they concentrated instead on numbers of dead, ages of victims, numbers of states closing or opening, clinics, and quantities of vaccine.

Two further episodes indicate just how great the contrast can be between a story written by an investigative journalist, who questions and assesses information, and one who merely passes on information received. Jeffrey Smith (1977) provides an excellent example of the former. In January 1977, officials at the U.S. Food and Drug Administration (FDA) announced that they were monitoring closely a Canadian study on the relationship between saccharin and cancer. On 9 March, they learned that the Canadian government had resolved to ban this artificial sweetener, and decided to take simultaneous action. The press release announcing the FDA’s ban was based on that used in Canada. It included information about the Canadian finding that saccharin produced malignant bladder tumours in rats, and a calculation that the dosage used in these tests was equivalent to what a human being would receive from consuming 800 cans of soft drinks daily for a lifetime. The announcement also stated that the ban was obligatory in the light of the Delaney clause of the Federal Food, Drug and Cosmetic Act. That clause prohibits the use in food of any ingredient that has been shown to cause cancer in animals or man.

‘Almost without exception’, Smith records, ‘major news media faithfully reprinted the dosage level notation... As a result, the central issue of the ban — the risk to humans of saccharin consumption — was grievously understated by news accounts that failed to explain properly the scientific evidence behind the ban. Seen in the light of the implication in the FDA statement that the ban was necessary more for legal than for medical reasons, the dosage level comparison made the ban appear to be ludicrous.’

Only a few articles, including one in the New York Times and one in the New
Republic, carefully explained that the tests and dosage levels followed accepted scientific practice: that other toxic chemicals had to be given to animals in apparently disproportionately huge doses if they were to indicate genuine risks to man. Criticism of the ban which was widely publicised was that from the Calorie Control Council — but the information that this organisation was funded by the saccharin and diet industry was conspicuously absent from most newspaper accounts of its attack. Another study, conducted by Dr. Frederik Coulston of the Albany (New York) Medical Center, showing that there was no saccharin hazard to rhesus monkeys, was also widely reported. The press stated that this study had been sponsored by the FDA: what was not reported was the fact that it had been jointly sponsored by saccharin and sugar producers. In more than 100 interviews, Dr. Coulston said later, no one had asked him about private funding. Only after congressional hearings on the subject did all aspects of the ban receive a thorough airing. The Washington Post identified the Calorie Control Council’s funding on 26 March, and other publications began to give a realistic and accurate assessment of the Canadian evidence and the risks to human health. According to Smith, Richard Lyons of the New York Times later admitted that ‘the initial coverage left a lot to be desired’. The FDA press conference had been called shortly before most reporting deadlines, and on the day when Washington was preoccupied with a siege by Hansa Höfmanns. Moreover, very few of the published accounts reflected the background and the concern about the safety of saccharin going back to 1907. What was missing above all, apart from elementary points about research funding, was an explanation of the basic scientific concepts of risk and probability in assessing a supposed hazard.

Compare this story with the article contributed to the Columbia Journalism Review by Dan Greenberg (1973) entitled ‘A critical look at cancer coverage’. It began with material issued by the American Cancer Society — an organisation that has long maintained close links with the press, via annual seminars for science writers timed to coincide with fund-raising drives. Greenberg started with one of the society’s publications, The Hopeful Side of Cancer, which claimed that ‘cancer is one of the most curable of the major diseases in this country’, and with a statement by Frank Reamer, director of the National Cancer Institute, that ‘the five-year survival rate for cancer patients in the 1930s was about one in five. Today, the figure is one in three.’ The implication behind these remarks was that progress was slow, but steady. Many medical and science correspondents took such assurances at face value, and reported them in their newspapers. Greenberg looked at the figures more carefully. First, he showed that most of the improvement since the 1930s was achieved before 1955. Over the past two decades, he found survival rates had not altered much, and some had even deteriorated. Thus the chance of living for one year with cancer of the colon in the U.S.A. fell from 68% in 1950–1952 to 63% in 1970–1971. The five-year survival rate for cervical cancer rose from 43% in 1941–1949 to 59% in 1951–1959, but then dropped to 56% in the period 1965–1969. Five-year survival rates for cancer of the stomach and rectum, Greenberg noted, had remained at around 13% and 30%, respectively since 1950. For oesophageal cancer, the figure declined from 4% to 3% over the 25 years up to 1975. What seems to have happened during the 1940s and 1950s was not that more people were surviving cancer, but that a greater number were withstanding cancer surgery. Antibiotics and blood transfusions had reduced the toll of life from such operations. But since 1955, when deaths from surgery became negligible, the prospects of surviving most common cancers had changed little. The National Cancer Institute’s figures showed that, for a range of cancers accounting for 58% of the total incidence of the disease, the upward trend in survival rates had not exceeded a few percentage points. And for some tumours (representing about 13% of incidence) the rate had fallen. Though improvements of five, or more, per cent in survival rates had been achieved for the remaining 22% of cases, the overall picture was far gloomier than that conveyed by the cancer research organisations.

As Greenberg observed: ‘a generally passive press has been the means of transmission. In statistic-studded literature, and at events like the ACS’s annual seminars for medical writers, one usually finds grounds for optimism — guarded and qualified, but still optimism.’ Why, Greenberg asked several cancer researchers, were encouraging reports still issued that were in conflict with the harsh facts? ‘The consensus of responses was that there is no conscious intention to mislead the public. Rather, there is a desire to sustain public support and federal appropriations by conveying a picture of an immensely difficult problem that will slowly yield if we spend on it and work on it.’ In that ticklish situation, the role of the press is certainly a difficult one. But an unquestioning stance by specialist reporters faced with such data is surely not in the long-term interests either of the public at large, or of the cancer research community.

Cancer research is not the only field where the scientific community has, over the past few decades, begun to believe that a friendly relationship with the press is useful (Dixon, 1976). As research funds have become more difficult to secure — and as public and political apprehension about science have increased — so research workers have realised that the newspapers can be of assistance. Barbara Culliton (1977) points out that, ‘to reach the public, including national and local politicians, the scientific community needs the press — not to do the entire job, but certainly a large and visible part of it. Concerned about their collective image, scientists have acquired a reluctant respect for public relations. The seeking of help from the press seems to be based on a reasonable assumption: their relations with the public depend on education. If they educate the press, the press will educate the public. An educated public will understand certain truths about science — that it is an ongoing process, that it can guarantee no magic cures for social or medical problems but will do its best, that serendipity is an article of scientific faith and, most of all, that the whole enterprise depends on stable funding.’
One of the clearest examples of how this works in practice comes from a time in 1971 when a team of high-energy physicists at CERN in Geneva was racing neck-and-neck with an American research group to discover a new elementary particle—the Omega. Talking to the sociologist, Jerry Gaston (1971), a member of the U.S. team later gave this account of what happened:

Well, finally we found the Omega. We submitted that to Physical Review Letters, and there is a ruling in PRL that you’re not allowed to publish in any other paper, journal or anything else, including newspapers, in advance of the publication date of PRL. So we called a news conference about a week before, with instructions that the newspapers weren’t allowed to publish it. Actually, we got a concession that the New York Times could publish in the Sunday edition in spite of the fact that PRL was to appear on the Monday, but they allowed that.

But there was a leak. The leak occurred through England, oddly enough. Someone in England knew by the grapevine that we had discovered the Omega and wrote a popular article before any experimental results were available. He knew just before publication date that in fact we had found it—and obviously fell to the temptation. He did not state that we had discovered it, but he did state that publication was imminent, which it was, but he didn’t say publication by whom.

Then the game goes on. This was picked up by the London New York Times correspondent and he knew that this was hot. He then interpreted it as the Omega had been discovered and he didn’t know who discovered it and couldn’t find out who, but he knew who was looking—Brookhaven and CERN. So he said the particle had been discovered at Brookhaven and CERN, but the heading was London. It was a big mess. It killed our publicity. We would have got first page New York Times Sunday, which is a very good thing to get. After all, where do we get our national money?—from Congress. It makes a great deal of difference if we get first page in the New York Times as most congressmen read the front page. It’s a factor and we can’t deny it, so it means an awful lot to us.

Then we kicked back. On Friday, we went to PRL and said ‘They’ve released it, what can we do now?’ They said, ‘Okay, don’t worry’, and we backed up the date and told the New York Times they could publish. What else could they do? They published on Friday stating that it was us.

The Brookhaven group, in other words, wished to publicise their discovery, not to inform the public about work conducted with public money, but to attract the attention of congressmen. They used a convenient stratagem—a press conference with an embargo some days ahead—in an attempt to muzzle the media until the appropriate moment. They felt resentful when things went wrong, but were still able to exploit the situation for their much needed publicity. It is significant in Gaston’s account, that there is no mention whatever of the public interest as such.

Gaston’s story raises another issue that has become increasingly important in science journalism since the last war—the harsh rule applied by journals such as Physical Review Letters to prior publication of research findings in the press. The New England Journal of Medicine adopts the same position, which has become known as the ‘Ingelfinger rule’, after the name of its most ardent proponent, Franz Ingelfinger, the former editor. The convention is that no investigator should cooperate with the press to any great extent—giving texts from which quotations can be made, or slides or tables for reproduction—in relations to work described in a paper submitted to a learned journal. The rule should apply, Ingelfinger believed, even to research that has been reported in preliminary fashion at a meeting or conference. He estimated that his journal abandoned six or seven papers a year because contributors offended against that convention (Calliton, 1972). The issue has become even more important as developments in genetic manipulation have been reported increasingly at press conferences before the results have appeared in a journal, and sometimes even before the biological activity of the molecules concerned has been demonstrated (Andreopoulous, 1980).

The problems inherent in this situation have not yet been resolved satisfactorily. On the one hand, journals such as Physical Review Letters and the New England Journal of Medicine, apart from irritation over being ‘scopped’, believe that the refereeing of papers before publication is important not only in vetting them for professional readers, but also in guaranteeing a corresponding level of authenticity to the public at large. On the other hand, reporters attending a meeting of, say, the European Physical Society, the American Medical Association or the U.K. Chemical Society, feel it legitimate to report on the proceedings at once, rather than wait perhaps many months before fuller accounts of papers delivered there appear in the appropriate journals. It is notable that a recent study group on science and the media, set up by the British Association for the Advancement of Science, which was composed of both scientists and science writers, concluded that ‘in a free society, it is unreasonable for scientists to expect the media to restrict themselves to material already published in the scientific literature. It is a proper function of the media to display the scientific method by showing science in the making’ (British Association, 1976).

No such problems appear to have troubled science writers before the war. Crowther (1970a, b), for example, tells the following story:

When, in 1939, I heard of the discovery of the neutron, I went at once to Cambridge, and learned that on that very evening Chadwick was to give the first account of his epochal discovery. It was to be at the club organized by Kapitsa for scientific discussions, and Kapitsa invited me to attend. I heard Chadwick’s account, and the immediate suggestions for further research. I wrote an account of the discovery for the Manchester Guardian. The American reporters especially had difficulty in getting first-hand information on the discovery, and the article was widely quoted in the American press.

If, in the less leisurely world of today, blame for premature publicity is to be allocated at all, much of it rests not with science correspondents, but with scientists themselves. As David Perlman (1974) reminds us, research teams at the University of Southern California and Georgetown University simultaneously and publicly revealed, in 1971, the discovery of what the New York Times called
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Professor Christiaan Barnard transplanted the heart of Louis Washkansky in December 1967, the press nonetheless ensured that public attention became focussed on the ethical questions surrounding heart transplantation and on unsolved scientific problems, which the enthusiasts tended to minimise at that time. Over the ensuing months, surgical teams in various parts of the world tackled the operation – the U.S.A. in December, India in February, France in May – and in several cases they plainly courted press attention. The British team, at the National Heart Hospital, London, in a mood of buoyant nationalism, called a press conference immediately after concluding their operation and sported special ties and ‘I’m backing Britain’ badges. That was barely five months after the hospital had denied firmly based press reports that a team there was preparing for heart transplantation, and had issued a statement saying there were ‘no plans to attempt such an operation’. It was also, of course, after Barnard had taken the initiative at the Groote Schuur Hospital, Capetown, and others were moving into the same glorious field.

Much of the publicity misfired. By triggering off a public debate, it led eventually to exposure of critical questions behind heart transplantation, including the provision of donors and the definition of the ‘moment of death’. There was certainly some ill-informed criticism. But largely because of discussion in the press (and on radio and television) a consensus arose – between the general public, on the one hand, and doctors and scientists initially unfamiliar with the details of the operation, on the other – that cardiac transplantation was ill-advised in the state of knowledge then current. Above all, the problem of immunological rejection of a grafted organ had not been satisfactorily solved. After a flurry of activity during 1968, heart transplantations came to a virtual end for some time.

‘Scientists are often puzzled by the seemingly capricious way in which media representatives select certain of their peers to serve as experts’, wrote Robert Shepherd and Erich Goode (1977). The point, well illustrated during the cardiac transplantation episode, applies equally well to many other scientific controversies. To try and explain the puzzle, Shepherd and Goode examined the professional and public literature during 1967–1972 in one field of biology – research into the effects of marijuana. They compared the papers cited in Index Medicus for this period with articles (excluding news stories on marijuana-related events) published in magazines and three of the largest circulation newspapers in the U.S.A. Their first conclusion was that the press did ‘a first-rate job of selecting for a news story research that is eventually frequently cited by other scientists’. There was an excellent correlation between citations in the learned journals and in the public press. But ‘the invocation of scientific experts in the popular press revealed a drastically different citation pattern’. Of the ten figures most frequently quoted by the media, only three had written articles on marijuana listed in Index Medicus; the others did not publish any at all that appeared in the scientific literature. The most cited persons, in fact had done no writing at all on the sub-
ject in journals, influential or otherwise. They were selected, instead, because they headed health-related institutions, such as the National Institutes of Health or the FDA.

Shepherd and Goode conclude: ‘The press seems to select as marijuana experts scientists who have considerably less expertise on marijuana than the average marijuana researcher. On the other hand, these figures also appear to have a significantly higher standing in fields and on subjects other than on marijuana than is true of the typical run-of-the-mill marijuana researcher. The path to becoming a publicly-recognized marijuana expert seems to be unrelated to conducting research on or writing on marijuana in scientific and medical journals that other scientists consider significant enough to cite.’ It depends on two quite different factors – being in charge of an influential agency or institute, or becoming known in areas tangentially related to the subject at issue. To be a ‘drug expert’, for example, means to command expertise in all aspects of drugs. Shepherd and Goode do not pursue journalists’ selection criteria very much further. One explanation of their findings could well be that, as well as being better known, directors of institutes and similar authorities with public positions are more accessible to the press, and more willing to make comments for publication, than are most laboratory researchers.

A particularly challenging problem for science journalists is posed by distinguished scientists speaking outside of their own specialism. As Perlman (1974) observes, ‘it is an obligation for science writers to report most carefully on the qualifications of those who claim scientific expertise, and at times to seek to balance their controversial statements. An eminent physicist may expatiate on his theories linking race and I.Q. When he does so, however, the conscientious science writer will note the physicist’s track record in genetics, and place his conclusions in the context of the ongoing controversy over race as a definable concept and I.Q. as a measurable culture-free entity; the reporter may even solicit comments on the physicist’s message from geneticists known to oppose his views.’

During a period when scientific developments play a considerably greater role in the social and political arena than in pre-war times, this obligation is strong. So, too, is the obligation on science writers to present balanced assessments of contemporary research. Thus, on the same day, 15 August, 1978, that De Volkskrant published its carefully cautious and detailed story on the Princeton announcement about thermonuclear fusion, with the headline ‘Kernfusion-energie nog onafzienbaar ver weg’ (Fusion energy still a long way off), another Netherlands daily, De Telegraaf, carried a much shorter story on its front page with the headline ‘Energie van kernfusion naderbij’ (Fusion energy imminent). The former was a much more informative account in its assessment of the complexities of the problem.

A similar example occurred in the British press on 10 February, 1977, when the National Radiological Protection Board published the results of a survey into the incidence of cancer in the workforce at the British Nuclear Fuels Ltd. plant at Windscale. The Guardian carried an account of the report with the headline ‘A-plant cancer risk “higher”’; while The Financial Times produced one headed ‘No greater cancer risk at Windscale – official report’. The explanation for this discrepancy was that the first correspondent selected a particular group of tumours and concentrated on an apparently significant difference in their rate of occurrence in Windscale workers and the population at large. The other writer took the gross statistics, and was able to show that there was no significant excess of cancers in Windscale employees. Neither story was sufficiently long to give a satisfactory account of the background information against which these figures could be assessed.

A very much worse category of error in modern science journalism is that which arises not from imbalance in a story produced by a specialist writer, but from the work of other individuals in a newspaper office who have as much, if not more, influence on what is published in a paper, and the form in which it appears. However competent, or incompetent, a science correspondent may be, he or she can have no more than a partial influence on what appears on the printed page. Whether or not a story is published, at what length, how it is edited and trimmed to fit the space available, and above all the headline – all are in the hands of someone else. A night editor and subeditors, for example, can largely determine the real prominence, structure and thus impact of any story written by a reporter. Whatever the individual journalist’s judgement, it is possible for these other people to distort, trivialize, or sensationalize a report that has been composed in a quite different form.

A typical example of an offence of this sort was an item about multiple sclerosis (MS) which appeared on the front page of The Sunday Times on 29 February, 1976. It was based on an annotation published the previous day in The Lancet describing an agent suspected of playing a role in the aetiology of MS. The account, by The Sunday Times medical correspondent, was a balanced presentation of evidence from Dr. Gertrude Henle’s laboratory in Philadelphia, and from elsewhere, suggesting the possible involvement of a recently discovered ‘virus’ in the disease. The annotation emphasized that the precise nature of the agent had yet to be determined, and Dr. Henle, herself, had stated publicly that her preliminary findings needed to be repeated in other laboratories before being accepted conclusively. Yet The Sunday Times gave the story a headline – ‘Scientists find the cause of multiple sclerosis’ – that went substantially beyond the available evidence. In a field that has seen as many disappointments and premature claims as has cancer research, the offending headline must have caused considerable distress to victims of MS and their relatives. Over the following few days, the Multiple Sclerosis Society and the Medical Research Council had to issue statements putting the record straight and explaining the uncertainty of the data implicating the newly discovered agent (it was not even certain that it was a virus) in MS.
The net result may well have been to cause even more confusion in the minds of newspaper readers and those following the news on television and radio. Lois deBakey (1974) instances headlines such as 'Test tube babies' and 'One step nearer to the super race', published in the early 1970s, as wording which led many people to conclude, erroneously, that human life was soon to be created in a test tube. 'The ensuing flood of letters from a roused and frightened public to newspaper editors clearly demonstrated the way distorting headlines can arouse unwarranted fear where understanding and social concern are needed.'

Even more reprehensible is the news item that is so brief as to be distorted, or misrepresented, the central message. On 19 April, 1974, The Times printed a report headed 'Arthritis wife's death'. It ran as follows:

Mrs Marie Louise Harris, aged 50, of Riverview Gardens, Barnes, who suffered from rheumatoid arthritis in her hands, died after being treated with a drug for arthritis, Hammersmith coroner's court, London, was told yesterday. A verdict of misadventure was recorded.

That was the entire report. It did not say whether a link between treatment and the patient's death was clearly established, merely suspect, or even remotely likely. It did not name the drug, or explain whether it was an established remedy, or whether the lady had been taking part in clinical trials with a new medication. There was no information about known, or previously unknown, side-effects that could have been to blame, no comments about such matters as drug interactions or dosage, or the doctor's responsibility, nothing to tell the reader whether the drug concerned was widely used, or whether any action had been taken as a result of the incident. One can only speculate about the effect of such a dangerously incomplete account in creating anxiety among other people with arthritis.

Another example was published in the Northern Echo, a U.K. provincial newspaper, on 3 June, 1976, the day after science correspondents had been taken around the Paediatric Research Unit at Guy's Hospital Medical School, London, and been given literature about work in progress there. The Northern Echo's report of the occasion read as follows: 'Killer cure. London's Guy's Hospital paediatric research chief Prof. Paul Polani yesterday came up with a pre-birth cure for spastic and mongol babies: abort them.' Again, the error was not simply in the crude (and inaccurate) style of the report. It was in the supposition that a subject of such complexity and delicacy could be adequately reported in a news item totalling 26 words.

Peter Farago (1976) points out that between half a million and two million words pour into a newspaper office every day, of which only about a tenth can be published. Moreover, 'All executive decisions, writing, accepting and editing must be accomplished in a matter of three or four hours a day.' A large proportion of the mistakes and distortions in science reporting can be traced to the exigencies of a newspaper office, to which Farago refers. Editors believe that science must invariably be handled as hot news, so that a hasty report often takes the place of a more reflective piece the day afterwards. Stories that are carefully structured so as to include qualifications, proviso and balancing contrary opinions on disputations issues may be shortened by staff with little understanding of science. Headlines are often written by those who do not appreciate the nuances of a piece composed in this way. And, with the exception of those newspapers, such as Le Monde and the New York Times, which sport sizeable science staffs, technical stories may be put together, in the absence of the solitary specialist, by general reporters who lack the appropriate background knowledge.

In his book Technology and Social Shock, Edward Lawless (1978) traces 45 case histories of public concern over the secondary effects of new technologies during the mid-1970s. One of his conclusions is that 'on the whole the news media have not done a particularly creditable job of reporting scientific and technological events to the public over the last 30 years. They tend to overdo the bizarre or the scare aspects at the beginning of a case and seldom follow through to summarize adequately the resolution of the issue.' Much of this criticism applies to those newspapers whose science correspondents, single-handedly, have to follow the entire spectrum of science, from radio astronomy to molecular biology. By the same token, those publications which do cover scientific stories in depth over substantial periods of time are for the most part those which have sizeable science staffs, and which allocate a commensurate amount of space to their work. Similar criticisms are expressed by Goodfield (1981).

With the increased obligations and responsibilities on science writers over the past four decades, the deficiencies in much newspaper coverage of science have become correspondingly more conspicuous. Science writers themselves have been active in drawing attention to the problems they face, and in calling for greater resources to be ploughed into media science. The 'Salzburg declaration', for example, was followed by a warning from the EUSAJ that 'an indispensable condition for the improvement of science coverage is a change in attitude among many newspaper publishers and editors and radio and television companies. It is necessary to develop special science departments in the mass media and improve the integration of science with other news coverage.' Among other points made by the EUSAJ were that 'science journalists must be given opportunities for continuous retraining and education'; that 'access to information sources in ministries (including science attaches), public bodies, research institutions, universities and industry must be ensured'; and that 'support must also come from international organisations (EEC, Council of Europe, UNESCO, etc.).'

In Europe, the government of the Netherlands has gone further than others in seeking to help science journalists, and to improve the standard of media coverage of science. The University of Amsterdam has established a programme to teach scientists how to popularise their research work, while the University of Utrecht runs a course for journalists who wish to improve their understanding of
science and technology. In addition, a science information bureau, supported
by the government, but based at the Royal Academy of Sciences in Amsterdam,
gave permanent status in 1978, to help the press and public with information
on contemporary issues. As explained by Boeker (1978), the aim is to provide
'objectified information'—implying that, 'neither the Academy nor its independent
information bureau should take a position on any matter of possible social or
political controversy'.

There is a shortage of reliable evidence about the reactions of consumers to
science in the press, but the indicators that are available point to a considerable,
and to some degree unsatisfied, interest. For example, a report prepared for the
Canadian Ministry of Science and Technology by Orest Dubas and Lisa Martel
(1976), based on a survey of 2000 readers, television viewers and radio
listeners, revealed that science rated more highly than industry, entertainment and even
sport. Some 84% of people found local news stories 'interesting'. This was the highest
rating for any category considered. Nostalgia was medicine and health (which Dubas
and Martel count as scientific), which interested 78% of respondents—
beating entertainment and sport. Even when science was divided into medicine
and 'other sciences', the latter category rated 49% of interested respondents—
as against 48%, for national politics and a mere 26% for society gossip. Some 82% of
the sample felt it important to be kept informed about science, and only 19% believed
science was 'mainly for the well-educated people'. Over half of the participants (54%)
said that they did not get sufficient science coverage.

A survey published in 1977 by the Commission of the European Communities,
though it did not specifically examine public reactions to science in the press,
confirmed a similar level of general interest in science (Commission of the European
Communities, 1977). The study was conducted by specialised institutes in the nine
EEC countries—Belgium, Denmark, Germany, France, Ireland, Italy, Luxembourg,
the Netherlands, and the United Kingdom. A total of over 9000 people were interviewed.
In a multiple-choice question about the significance of science, with answers ranging from 'all it does is satisfy the curiosity of scientists', to 'it's dangerous', 69% of participants selected 'it is one of the most important factors in the improvement of our daily life'. Some 66% of respondents said they took an interest in scientific discoveries when these were described in newspapers and
on radio and television, and 52% wished to see more programmes or news, on television involving living scientists; only 2% wanted less.

Similarly, an attempt by the Association of Science Writers in France in 1977
to learn about public attitudes to science showed (on the basis of street interviews)
that most of those questioned claimed to read science in the daily press because they
'needed to be informed' (Kahn, 1978). Another suggestive survey was carried out in
1974 among the 1200 subscribers to the four regional newspapers in the Brabant
Press B.V. group in Holland. Readers were asked to choose, from a list of 50 sub-
jects, the one which they most preferred to read about (Schuuring, 1978). The
journalists working for the newspaper group estimated that 'science and technolo-
gy would reach 35th place on the list. In fact, the subject came an average of
12th for the four newspapers. The rating was highest—8th place—for the edition of
the newspaper published in Eindhoven (which probably reflects the local inter-
est in science and technology resulting from the presence of Philips and of the
Technical University). In this latter case, the top ratings were: (1) consumer news, (2) medical information, (3) educational subjects, (4) environmental news,
(5) leisure time information, (6) stories on people, and (7) local sport. Local politics
came after science and technology, in ninth position.

Another pointer comes from research in the U.S.A. into public regard for
science as compared with other institutions. Surveys carried out in 1966, 1971,
1972 and 1973 suggest that although public confidence in many institutions declined over this period, science lost ground less spectacularly than, for example, the military, major companies, or education. In the spring of 1973, science
ranked second, with education, in eliciting 'great confidence' from the public.
Some 54% of those questioned manifested this confidence in medicine, 37% in
science and education, 32% in the U.S. Supreme Court, and 23% in Congress.
The corresponding figures for 1976 were 72%, 56%, 61%, 51%, and 42%.
Amidst Ezioni and Clyde Nunn (1974) conclude from this, and other data, that
while science seems to command more confidence than many other institutions,
it might stand to gain further respect 'by explaining to the public more fully what it is and what it does'. Compared with all other institutions, science received the highest percentage of 'don't knows' in the 1973 survey. It is also significant that
recent years have seen a remarkable growth in magazines about science addressed
to the general reader—particularly in the United States, where Omni appeared in
1978, Science 80 was launched in 1979, and Discover appeared in 1980.

In summary, the present-day position is one in which there is substantial
public interest in science, but this, in many countries, may well be unfulfilled
by the daily press. Despite the growth in the craft of science journalism—William
Dick (1954), writing less than a third of the way into the period under review,
remarked that most national newspapers in Britain had already acquired science
specialists, compared with only the Manchester Guardian and Daily Herald before
the war—and there is still considerable scope for expansion. As we have seen, many
of the unsatisfactory aspects of newspaper coverage of science result from a lack
of space in which issues can be covered with sufficient thoroughness, and/or a
shortage of qualified staff who understand the subject matter and its implications.
Lord Zuckerman (1975) has expressed concern about 'popular exponents of
science who, because of public interest and demand, do not have the time to
explore deeply, to question and cross-examine, before broadcasting opinions in
the media about the dramatic social significance of some presumed new scientific
observation', and argued: 'nor are these persuasive 'science writers' likely to
have the experience necessary to judge which side to back in matters that are con-

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trouversial'. The answer to this charge is not to return, as argued earlier by Zuckerman (1971), to a conception of science writing as an activity concerned simply to purvey received information. In view of the mass of material - press releases, learned journals, reports, news of scientific meetings - which reaches newspaper science correspondents, and in view of considerable public concern about the practical repercussions of science, that interpretation is in any case unrealistic. The journalist has to make choices and to apply judgements continuously.

There is room for debate about the degree to which writers should exploit their position to advance particular opinions. (The writings of Ronald Bedford, science editor of the Daily Mirror were instrumental in getting the Corneal Grafting Act of 1952 onto the Statute Book in Britain. Few would quibble with that achievement, though journalists' use of their privileged position to persuade readers of the rights or wrongs of, for example, a nuclear power programme is more questionable.) But that, in order to do the job effectively and responsibly, science writers need to do a good deal more than simply repudiate and regret the material that comes their way, is surely unquestionable. By far the greater proportion of the manifest failings of the press in this regard are due not to the incompetence, or mischief, of individual science writers, but to lack of resources, coupled with the bizzare ethic of newswatching, according to which a hastily written item published today is preferable to a more considered analysis tomorrow. Both in the days of J.B.S. Haldane, and in modern times of frenetic debate about nuclear power and genetic manipulation, the most valuable contributions have always been of the second variety - despite the talent and skill which often go into the first.

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References