A Question of Quality: How Journalists and News Sources Evaluate Coverage of Environmental Risk

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Judgments of what makes a "bigb-quality" news story about risk indicate that traditional news sources—scientists and representatives from government and industry—are more interested in supporting the status quo than journalists and advocates are in undermining it.

Most of what Americans know about radon, pesticides, hazardous waste, the greenhouse effect, and other environmental risks comes from watching television and reading newspapers (5, 25, 26, 27, 43, 45). The information they acquire affects whether they pressure government to oppose new facilities or welcome them, whether they demand restrictions on research and development or embrace them, and whether they move out of a community or stay. The relative effectiveness of public communication about environmental risk has high stakes for industry, government, and society (21).

But many of these stakeholders have severely criticized the mass media's performance. Industry and government officials, leading scientists, and representatives of environmental advocacy groups criticize the media for exaggerating and sensationalizing some risks, omitting important information, distorting data, and in general leading the public to ignore important hazards and worry about minor ones (8, 31, 32, 34, 35, 36). Surveys show that the majority of scientists support these criticisms (4, 7, 44). To understand what factors contribute to outspoken criticism of stories about environmental risk in the mass media, we examined two of the "subsystems" (42) of the science communication process: journalists and their news-gathering practices and values, and scientific information sources and their professional modes of inquiry, communication practices, and values.

We began by examining how journalists have traditionally defined criteria for

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Although reporters are expected to produce "accurate" stories, considerable evidence suggests that events and their depiction by the news media often differ (10). A study of the fidelity of news stories to the events they describe (9) found that what reporters emphasized was partly related to how credible they found the source and whether they agreed with the source's message. In other examples, Starck and Soloski (38) found that reporters' perceptions of their professional role and their attitudes toward sources affected the judged fairness of the stories they wrote, and Lichter et al. (17) found a gap between nuclear energy experts' more positive views of nuclear energy and news coverage's more negative emphasis. Finally, two studies found that "sensational" aspects of stories about science topics were featured more than the journalistic ideal of "objectivity" would seem to dictate (12, 41). On the other hand, mass media coverage during the infamous accident at Three Mile Island was generally judged to be more balanced and less sensational than expected (33, 39).

Several studies have documented scientists' dissatisfaction with science news coverage. In three studies of print media and a fourth study of broadcast media, scientists were asked about the kinds of errors that appeared in science news stories. The omission of relevant information (including quotes used out of context), misleading headlines, and story brevity were all contributing factors to their somewhat negative perception of science news accuracy (20, 29, 40, 42).

Scientific knowledge accumulates over extended periods and is constantly evolving. News, on the other hand, is fleeting—what's news today probably will not be news next week. Reporters' interest in stories that emphasize human interest and conflict and are novel, timely, and proximate limits their likely interest in (or time to obtain) the technical or other background information that scientists and officials believe is relevant. Under these journalistic constraints, news coverage of science tends to suffer—at least if technical completeness is a standard of quality.

If reporters strive for the ideal of journalistic objectivity by treating all sides of an environmental controversy fairly and accurately (22) and if scientific news sources and the other stakeholders in environmental controversies are still critical of news coverage, the criticism may be due in part to different criteria being used to define a "quality" news story about environmental risk. And although it is likely that the groups are using different criteria, no studies have tried to determine empirically if these criteria exist or how they might affect communication about environmental risk. Moreover, most research on science journalism has focused only on the relationships between scientists and journalists.



But covering environmental risk topics (a subset of science news) requires that journalists rely on other sources of information, such as industry officials, government regulators, and environmental advocates (13, 34). Our goal was to include these other routinely used environmental news sources in order to investigate each group's criteria in rating the quality of stories about environmental risk and to consider the implications of these results for the risk communication process.

Our study focuses on two questions. First, do journalists make different judgments of story quality than representatives of industry, government, environmental advocacy groups, and academic science? Second, are journalists' reasons for judging high- and low-quality stories different from the reasons of these other groups?

We compared journalists' judgments about the quality of more than 200 television and newspaper stories on environmental risk with the judgments of industry representatives, government officials, environmental advocates, and academic scientists. Journalists are trained to present accurate, informative, balanced, and interesting stories, and they believe that stories should both have important consequences for their readers and be interesting to read. We therefore expected them to assign a low rating—indicating poor quality—to environmental risk stories that neglected basic risk information. We also expected journalists to give higher ratings to stories about serious environmental risks that included alarming facts and images and a great deal of risk information, and were written in a tone that they considered more alarming than reassuring.

Because industry, government, and many academic scientists are part of the U.S. power structure, we expected these three groups to give higher ratings of

quality to stories that promoted trust in their institutions and were written in a tone designed to reassure the public. In addition, we expected academic scientists to give higher ratings to stories that emphasized risk information in a non-alarming way.

We had two competing expectations about advocacy group representatives. Advocates might be expected to favor news stories that include risk information, are accurate, include alarming content (facts, tone, and imagery), stress the seriousness of the risk, and question the credibility of public institutions. But advocacy groups also might be seen to have an interest in supporting public trust of progressive industries and governments and in not wanting to alarm the public unnecessarily; thus they might give low ratings of quality to stories that are perceived to undermine trust and alarm the public.

To determine empirically what representatives of each group consider a "quality" news story on environmental risk, we collected the news coverage of four different environmental hazards, selected to vary the location of the environmental problem (urban, suburban, rural) and the parties responsible for causing and solving it (industry, government, both industry and government):

The first story was set in Times Beach, Missouri, a small town (population 2,041 in 1980) on the Meramec River, where a contractor had sprayed dioxincontaminated waste oil on unpaved roads in the early 1970s. The U.S. Environmental Protection Agency (EPA) began testing Times Beach for dioxin in November 1982. After the Meramec flooded in December 1982, officials were concerned about the spread of dioxin contamination from streets into homes. When testing confirmed high concentrations, the Centers for Disease Control asked residents to evacuate. A few months later, EPA bought contaminated homes and businesses, paid for relocating residents, and closed the town.

Times Beach is a small, rural town far removed from the big Eastern news centers. Although private enterprise caused the contamination, the federal government was clearly responsible for managing it.

The second story concerned methyl isocyanate (MIC). In December 1984, a large cloud of MIC leaked from the Union Carbide pesticide plant in Bhopal, India, killing 2,500 people over several days. At the time, MIC was also being produced in Institute, West Virginia (population 63,968 in 1980), just west of Charleston. Union Carbide stopped production, though it maintained that a similar leak could not happen in Institute. However, in early 1985 there were claims of earlier unreported leaks of MIC in Institute, and an internal Union Carbide memo suggested that conditions could precipitate a major leak of MIC at the Institute plant. In August 1985, aldicarb oxime and methylene chloride, both toxins, leaked from a temporary storage tank at the West Virginia plant.

Institute is a town in a poor rural state, dependent on a corporation whose credibility had been undermined by the Bhopal incident and questionable local practices.

The third story involved the manufacturing of pesticides in the Ironbound section of Newark, New Jersey (population 329,248 in 1980). In June 1983, as part of a major sampling program, New Jersey state officials found high concentrations of dioxin at an abandoned plant and in the surrounding neighborhood.

The risk associated with eating food purchased from a nearby open food market quickly became the center of attention.

Ironbound is a poor, ethnic community located in a major media center. Industry was responsible for the contamination, but state government became responsible for deciding how to manage the site.

The final story was about radon gas, which is produced by the natural decay of uranium. Radon seeps into homes, schools, offices, and other closed buildings through cracks and builds up in poorly ventilated areas. A National Academy of Sciences committee estimated that 13,000 Americans a year die of lung cancers caused by exposure to radon and its alpha-emitting decay products (16).

In March 1986, as part of a radon-sampling program, the State of New Jersey found radon values 250 times the recommended safety level of 4 picoCuries per liter of air in one Clinton, New Jersey, home. Thirty other homes were also found to contain very high levels. Newspaper stories described community and state efforts to grapple with the problem of radon testing, the fear of reduced property values, and the reduction of radon concentrations in highly contaminated homes.

Clinton is a small but rapidly growing affluent suburban community (population 7,345 in 1980) threatened by an invisible natural hazard. No one could be blamed for causing the radon problem. The State of New Jersey and local government attempted to manage it.

We collected stories about Times Beach and Institute from the nightly network news broadcasts of ABC, CBS, and NBC, as provided on videotape by the Vanderbilt University News Archive. We collected stories about Newark from six national, regional, and local newspapers—the *Asbury Park Press*, Bergen *Record*, Camden *Courier-Post*, *New York Times*, *Philadelphia Inquirer*, and Newark *Star-Ledger*. To include local coverage for the Clinton case study, we added a seventh paper to the group—the Bridgewater *Courier-News*. There were 100 television stories (49 about Institute, 51 about Times Beach) and 102 newspaper stories (57 about Clinton, 45 about Newark).

Each of the four sets of stories was analyzed over the course of a day by a five-person panel. Each panel consisted of one of four industry representatives (from American Cyanamid, Bristol Myers, Ciba-Geigy, and the Port Authority of New York and New Jersey), one of four government officials (one from the U.S. Environmental Protection Agency and three from the New Jersey Department of Environmental Protection), one of four environmental advocates (from the American Lung Association, the Environmental Defense Fund, the Sierra Club, and the New Jersey Environmental Lobby), one of four academic scientists (two from the University of Medicine and Dentistry of New Jersey– Robert Wood Johnson Medical School and two from Rutgers University), and one of four journalists (three from newspapers [*Asbury Park Press, Courier-News*, and *Star-Ledger*] and one from television [New Jersey Network]). Stories for each of the four case studies were presented in three roughly equal groupings. Panelists viewed or read a story from a group and then evaluated the story using several five- to ten-point scales. Evaluations were made without discussion among the panelists. This procedure was repeated for each story in the group. After panelists were finished evaluating an entire group of stories, they were led through an open-ended discussion.

Nine scales were used to measure five variables. The first scale measured the overall quality of the story. The second scale measured respondents' assessment of story accuracy. The third and fourth scales asked about the types of information in the story (one measuring the emphasis on risk assessment information and the other measuring the emphasis on politics, blame, and other nonrisk information). The fifth scale measured the trustworthiness of government officials, industry representatives, and experts (based only on information presented in the story). The remaining four scales focused on alarm versus reassurance—the alarming or reassuring effect of facts, the alarming or reassuring effect of imagery and tone, the overall tendency of the story to be loaded toward alarm or reassurance, and the likelihood that the situation discussed would lead to a serious health problem (based only on information presented in the story).

There were 1,010 (202 stories \times 5 types of panelists) potential ratings of quality, accuracy, information emphasis (risk or other), trust, and alarm versus reassurance. However, fifteen stories were not rated by one expert, which reduced the total number of ratings to 995.¹

If journalists are more satisfied than news sources with news coverage, they should give stories a higher average rating of quality. We calculated mean values for each of the four case studies (Institute, Times Beach, Newark, and Clinton) and for each of the five types of panelists (journalists, scientists, government officials, industry representatives, and environmental advocates). Overall quality ratings were compared using a t-test of matched pairs.

As seen in Table 1, the 995 ratings of story quality tend to cluster around the neutral quality rating of 3. Only 7.5 percent of the ratings received the lowest possible rating of 1 and 6.4 percent the highest possible rating of 5. Eighty-six percent of the ratings were between 2 and 4 (18.4 percent rated 2, 35.9 percent rated 3, and 31.8 percent rated 4). Clustering around the average value held true for all stories and all panelists. The average rating of the Institute coverage was 3.29, the highest of the four case studies (see Table 1). Yet this average rating was only 12 percent higher than the lowest average rating of 2.95, for the Clinton coverage. The advocates' 3.36 average rating was the highest, but it was only 16 percent higher than the lowest group average of 2.89 (by scientists). Journalists' average rating was 3.06, almost identical to the overall average of 3.11 and the neutral rating of 3.00.

Although journalists' and sources' aggregate judgments of news quality were very similar overall, there were some notable individual differences. Scientists gave relatively low ratings of quality and advocates gave relatively high ratings.

¹ One thousand samples are more than sufficient for quantitative analysis. We must underscore the fact, however, that the evaluations were made by only twenty panelists. We would be far more assertive about our results had 57 journalists rated the 57 Clinton stories rather than one journalist.

Expert panelist	All stories (n = 202) X	Times Beach (n = 51) X	Institute (n = 49) x	Newark (n = 45) 8	Clinton (n = 57) 8	Range* (n = 202)
Journalist	3.06	3.58°	3.00	3.04	2.72	1.32
Industry	3.05	3.37°	3.16	2.51	3.11	1.34
Government	3.20	2.67	3.83⊳	3.60°	2.82	1.43
Scientist	2.89	2.76	3.15	2.82	2.84	1.14
Advocate	3.36	3.63°	3.33	3.21°	3.25ª	1.13
All experts	3.11	3.19	3.29	3.04	2.95	_

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^a Ratings are significantly higher than government and scientist ratings at p < .05.

^b Rating is significantly higher than industry, scientist, and journalist ratings at p < .05.

 $^{\circ}$ Ratings are significantly higher than scientist and industry ratings at p < .05.

^a Rating is significantly higher than scientist, government, and journalist ratings at p < .05.

* Highest average divided by lowest average.

Government officials, industry representatives, and journalists had a greater range of ratings than scientists and advocates. Government officials gave their lowest ratings of quality to news coverage of Times Beach and Clinton (stories where government was the responsible party) and their highest ratings of quality to news coverage of Institute and Newark (stories where government was not the only responsible party). Industry representatives gave their lowest ratings of quality to news coverage of Newark, but they gave above-neutral ratings to the other three case studies. Journalists gave relatively low ratings of quality to news coverage of Clinton and Institute and high ratings of quality to news coverage of Times Beach.

In sum, for our four case studies the four journalists and sixteen news sources tended to rate the quality of coverage as roughly neutral—that is, three on a five-point scale. Advocates rated the stories higher than any other group; academic scientists rated them lower. Government officials, journalists, and industry representatives gave the second, third, and fourth highest ratings, respectively.

We used a multivariate, stepwise discriminant analysis to determine empirically which of the news characteristics we tested were most important for determining the experts' ratings of quality. Discriminant analysis allows us to identify sets of interrelated discriminating variables. For each of the eight explanatory variables, the higher the value of F reported in Table 2, the stronger the discriminating power. Correlations between individual variables and the discriminant functions identify the strongest discriminating variables and the direction of their effect. These correlations are also reported in Table 2.

The ability of the variables to discriminate between groups (low quality to high quality) is measured by comparing the group each case actually belongs

	Expert panelist					
	Journalist		Industry			
Explanatory variable	F	r	F	r		
Accuracy	6.5*	.38	82.3*	.89		
Emphasis on risk	48.8*	.73	17.4*	.31		
Emphasis on other	20.8*	53	3.2			
Trust	1.5		16.9*	.40		
Alarmina facts	4.9*		3.4			
Alarmina images	20.3*	.47	6.5*			
Loaded alarmina	15.7*	.41	16.9*	48		
Seriousness of problem	10.2*	.37	6.3*			
% correctly classified	94.0		93.0			

Table 2: Discriminant analysis of high-quality and low-quality stories

• p < .05.

to with a predicted group obtained from equations derived from the discriminant analysis. The higher the percentage of cases correctly classified, the better the discriminating power of the explanatory variables.

Of the 995 ratings, 228 were eliminated because of missing responses to one or more of the eight explanatory variables. Our initial discriminant analysis runs thus were made with 76 percent of the potential observations (767 of 1,010), divided into five groups derived from the five-point quality ratings. Group 1 consisted of the stories rated lowest in quality, group 2 of the stories rated second lowest in quality, and so on. The eight explanatory variables were able to distinguish reliably between high and low quality (that is, two or more point differences in quality ratings), but not between smaller differences. Accordingly, we combined groups 1 and 2 into a low rating group and groups 4 and 5 into a high rating group, and excluded the neutral rating group from our final analysis. The discriminant analysis presented in Table 2 is a test of the ability of the eight variables to distinguish between the characteristics of 421 ratings of high quality and low quality.

Industry representatives rated the stories as we had expected (see Table 2). Accuracy was their strongest discriminator (r = .89), followed by whether the story was loaded toward alarm as opposed to reassurance (r = -.48). Industry representatives also emphasized trust (r = .40) and risk information (r = .31) in their ratings. These four explanatory variables correctly classified 93 percent of the ratings. Thus, these panelists gave higher ratings of quality to stories they considered accurate, calming, portraying officials as trustworthy, and including risk information. Their strong negative reaction to alarming or inaccurate information that undermines trust is illustrated by one comment about Institute coverage:

Frankly, I think the reporting was an absolute disaster. You immediately thought, My God! The incompetency there. There's no interest or care about safety. The reporting was terribly distorted, biased against industry. It was

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	Expert panelist							
	Government		Advocate		Scientist			
Explanatory variable	F	r	F	r	F	r		
Accuracy	73.2*	.84	13.7 *	.57	44.9 °	.87		
Emphasis on risk	0.7		4.5*	.32	14.5*	.55		
Emphasis on other	3.6		2.6		0.9			
Trust	1.3		0.4		10.0 *			
Alarming facts	0.5		0.7		6.2*	32		
Alarming images	0.6		0.4		3.4	37		
Loaded alarming	27.6*	52	0.5		0.8			
Seriousness of problem	5.1*		3.4		0.8			
% correctly classified	93.0		79.0		83.0			

Correlations between explanatory factors and discriminant function of less than .30 are not shown. The analysis is based on 421 ratings of high- and low-quality stories.

wonderful. It was a playground for the media. They had a marvelous time at it.

Government representatives, too, focused on accuracy and on whether the overall story seemed alarming or reassuring. Accuracy was the strongest discriminator (r = .84) and overall alarm versus reassurance the second strongest (r = -.52), together correctly classifying 93 percent of the ratings. Thus, they felt that the best news stories about environmental risk were the most accurate and the most reassuring. The importance of these two criteria is illustrated by the following comment about coverage of Times Beach:

It was much more than the skull and crossbones that they showed. They really never defined what chloracne is. I would have liked to [have] seen much earlier on, some medical doctors or someone else with much stronger credentials in epidemiology and toxicology speaking. In terms of communicating risk, they communicated alarm.

We were surprised that trust was not a significant discriminator. Government officials generally felt that the government was being treated fairly, as one comment about Clinton coverage illustrates:

Our scientists didn't really know. Because of that they were treated fairly. The fact that New Jersey jumped on it [the radon problem], reacted and did something about it was very positive and added to credibility. The town officials came across with more credibility. He [the mayor] didn't try to hide anything. The people trusted him.

As we had expected, scientists gave high ratings to stories that they perceived to be accurate (r = .87), to emphasize risk information (r = .55), and to deemphasize alarming images and tone (r = -.37) and alarming facts (r = -.32). Together these four variables correctly classified 83 percent of the ratings. Scientists also valued stories that emphasized trust. For scientists, however, trust was strongly correlated with an emphasis on risk information (r = .70), and so it was not a significant discriminator. One comment on Times Beach coverage underscores scientists' concern with accuracy and reassuring risk information:

They had one snippet on an epidemiologist's study and that's about it. They said it [dioxin] was a horribly deadly molecule. Very, very alarming. [One was left with the feeling that] the whole town was about to die and you're about to see pictures of bodies lying in the streets. In fact, of course, it [dioxin] has never killed anyone.

These results both confirm and extend conventional wisdom. As expected, scientists gave high ratings of quality to stories that emphasized accurate risk information, promoted trust in institutions, and were not alarming. And industry representatives, as expected, gave high ratings of quality to stories that they perceived as promoting trust in institutions and reassurance among the public. However, contrary to expectation, government officials did not use trust as an important criterion of quality. One reason may be that government officials see public trust as naturally waxing and waning depending on the relative success of public policy, and not as the outcome of public relations efforts (as some industry representatives might perceive).

Advocates gave their highest ratings to stories they considered accurate (r = .57) and believed emphasized risk information (r = .32). Together these variables correctly classified 79 percent of the ratings. Seriousness of the health problem (an aspect of the alarm-reassurance distinction) was advocates' third strongest concern, but it was not statistically significant.

The strength of each group's feelings was also unexpected. Advocates' ratings suggest that they were less concerned with whether stories were alarming (average F for the four alarm-reassurance scales = 1.25) and undercut trust (F = 0.4) than the government, industry, and academic scientist sources were concerned with whether the stories were reassuring (average F = 6.5) and promoted trust (average F = 9.3). Traditional news sources, usually seeing their own preferences as the norm, perceive advocates' preferences as extreme. However, our results suggest that advocates are less extreme in their preferences, and traditional news sources more extreme, than popular wisdom suggests. One comment on Institute coverage illustrates advocates' concern with risk information:

I never heard the word risk at all. They didn't explain how, or what, or why. Public health matters should receive more attention when needed. We don't need to see the new booties they just made for doggies.

The results from journalists were the most complex, with six variables significantly contributing to their judgments of high-quality stories. Accuracy, the most important discriminator for every source group, was only the fifth most important discriminator for journalists (r = .38). Emphasis on risk information (r = .73), deemphasis on other information (r = -.53), alarming imagery and tone (r = .47), a story loaded toward alarming (r = .41), and seriousness of the health problem (r = .37) were other discriminating variables, together accurately classifying 94 percent of the journalists' quality ratings. In other words, journalists gave high ratings of quality to stories they judged to be focused on risk information; generally alarming in terms of information, imagery, and tone; accurate; and focused on the seriousness of the health risk. Journalists' interest in risk information can be illustrated with one quote about Institute coverage:

Diligence in learning about scientific consequences lands on the cutting room floor. But this is like reading People magazine. Anybody could have done a better job. The one in which they quoted the experts—that was the best segment. Yes, that seemed to be the most balanced, the most scientist-oriented, the most risk-oriented report. That was where it peaked, and after that it was all downhill.

As we had expected, scientists gave high ratings to stories that were accurate and contained risk information. Industry representatives gave high ratings to stories that were accurate, reassuring, and not likely to undermine trust in official news sources. Government officials gave high ratings to stories that were accurate and reassuring. Representatives from environmental advocacy groups challenged our expectations by caring more about accuracy and risk information than about alarming the public.

Although journalists, as expected, rated alarming stories higher in quality than reassuring stories, they departed from their stereotype in

other ways. Journalists are frequently criticized for not incorporating risk information into stories. But here they rated risk information as the most important component of a high-quality story. One possible explanation, for which there is some anecdotal evidence for science journalism (11), is that editors and news producers, rather than reporters, are primarily responsible for the scarcity of risk information in environmental news. Editors may consider such information insufficiently interesting and controversial, or they may believe the public does not want technical detail, or they may eliminate the information in the competition for space and time. It is also possible that the journalists in this study were more interested in risk information than a representative sample of reporters would be, or that they expressed a stronger interest in such information than they would demonstrate on the job.

Government and industry sources, who frequently complain about the lack of risk information in the media, rated emphasis on risk information as much less important than the accuracy of news or its reassuring content. Perhaps these sources are looking not merely for more risk information but for risk information that is accurate and reassuring. Every news source rated accuracy as the most important characteristic of a high-quality story, but journalists rated it least important. We do not believe that journalists consider accuracy unimportant; rather, we believe they consider accuracy a precondition to all good news writing, necessary but insufficient. The best story, in their minds, gets the facts right, communicates an appropriate tone, and uses images (particularly in television news) to highlight a serious health problem.

News sources, on the other hand, are trained to present hypotheses, theories, and facts. Making highly complex technical facts understandable and interesting to the public (or to journalists) does not come naturally to technical experts. For this reason, we feel, sources were not as concerned with presentation as they were with accuracy and were perhaps inclined to see dramatically presented stories as inherently inaccurate.

These preliminary findings are most noteworthy because of the similarities we found among journalists and their sources (who are often portrayed as adversaries), but some interesting differences also emerged. Journalists, who are often accused by traditional news sources of not paying enough attention to information about risk, rated risk information as the most important factor in their judgments of a high-quality news story. Advocates, who are often accused of being extremists, were less extreme in their desire to alarm the public and undermine trust in institutions than traditional news sources were in their preference for stories that reassure the public and build trust. All sources (including advocates) considered accuracy an important component of story quality, as did journalists, although with somewhat less fervor. These findings suggest that there is a deeper desire among traditional news sources to support the status quo than there is among journalists and advocates to undermine it.

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