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ABSTRACT

Researchers have determined that the lay public makes risk judgments in ways that are very different from those advocated by scientists. Noting that these differences have caused considerable concern among those who promote and regulate health and safety, a study examined media coverage of the accident at the Robert E. Ginna nuclear power plant near Rochester, New York in 1982. It was hypothesized that (1) publications whose targeted audiences are more scientifically sophisticated will publish more specific risk assessment information, and (2) publications whose targeted audiences are less scientifically sophisticated will publish significantly more general risk assessment information. Publications in five categories, including newsmagazines for scientists, popular science magazines, prestige newspapers, news magazines, and newspapers were analyzed for such key variables as the words "risk," "risk estimation," "general risk statement," and "specific risk statement." As expected, results showed that publications whose audiences are more scientifically sophisticated printed more specific risk assessments than did those aimed at general audiences. However, articles in scientists' magazines used comparisons with greater frequency than did those in publications aimed at general audiences, and scientific publications were no more likely than nonscientific publications to cite sources for risk assessment information. Reference notes and six tables are appended. (DF)

Mass Communication and Society
and
Science Writing Educators' Group

Risk Analysis for Public Consumption: Media Coverage of the Ginna Nuclear Reactor Accident

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Risk Analysis for Public Consumption: Media Coverage of the Ginna Nuclear Reactor Accident

Researchers have determined recently that the lay public makes risk judgments in ways that are very different from those advocated by scientists.[1] The differences have caused considerable concern among those who promote and regulate our health and safety, and the search is on for a better understanding of ways in which nonscientists think about risk.[2]

Underlying that search is the assumption that the mass media exert a powerful influence on our risk perceptions. For many--particularly those who feel that public perceptions of risk are "nonrational"--that media role is regarded as pernicious. Cole charges that by simply covering scores of stories about health risks, the media confuse even the highly educated:

> Even those of us who consider ourselves educated live in a state of confusion. For example, 90 percent of my undergraduate students in a Columbia-Barnard course in the sociology of the law believe that use of the Pill is a significant risk to health; 95 percent of the women said they would not use it. How did these bright young people reach these conclusions? Not one of the women had consulted a physician or a scientific journal; all their information came from the NEW YORK TIMES or from television news reports.[3]

Burger goes even further in his study of print coverage of various medical risks done for The Media Institute. By sensationalizing and simplifying risk information, Burger argues, the media portray potential health threats as posing more risk than most doctors and scientists attribute to them.[4]

Concern with the media's influence on public perceptions of risk is so great it has prompted a number of conferences and policy papers, among them a major effort by the Twentieth Century

Fund, which organized a task force to study suggestions for improving risk coverage. Interestingly, like many such efforts, the task force bogged down in a host of contradictory information about media performance and media effects; the result was a relatively bland set of suggestions.[5]

One major problem with such ruminating is that it must take place atop a meager data base. To date, few studies have examined either the link between media information about risk and public attitudes or, even more fundamentally, what the media choose to print or to broadcast about risk. It is with the latter question that this study is concerned.

Relevant Literature

A number of studies suggest that the public relies on the mass media for risk information.[6] And other researchers report that, when given the option, people by and large want to be told about potential risks.[7]

Yet evidence of a causal link between media coverage of risk and people's risk perceptions is difficult to find. In a review of literature about perceptions of crime risk, for example, Tyler finds no evidence that media influence those perceptions. "Mass media reports of crime do not appear to be an important influence on fear of crime," he notes. "Instead, fear appears to be generated primarily through personal victimization and the experiences of friends and neighbors."[8]

But Mazur argues, to the contrary, that "media coverage of scientific controversies may do more than define and amplify an event; it may have profound effects on public attitudes, the precise nature of which is difficult to specify."[9] He suggests

that when coverage of a new technology (such as nuclear power) increases, public opposition to the technology also increases.

Public information campaigns also have been shown to increase public awareness and knowledge of health risks.[10] But these campaigns utilize several information outlets outside the mass media, so it often is difficult to isolate media effects. We have encountered no public information campaign study that discusses the specific relationship between risk information availability in the mass media and public risk perceptions.

Finally, one study of the Medfly eradication program in California found that media coverage of the eradication effort was a statistically significant predictor of residents' perceptions of the risk posed to the environment by spraying the flies (and everything else) with a pesticide.[11]

Studies of the risk information the media communicate also are sparse. Combs and Slovic report in a 1979 article that two newspapers overemphasized homicides, accidents and disasters and underemphasized diseases as causes of death.[12] Freimuth, Greenbert, DeWitt and Romano compared newspaper coverage of cancer in 1977 to that in 1980 and found that coverage of risk factors had increased dramatically.[13] A study of media coverage of the accident at Three Mile Island found that the media had used both alarming and reassuring statements to describe events, with coverage being predominantly reassuring.[14] And a recent study of coverage of chemical risks by major newspapers and television networks found that stories contained far more assertions that the risks were significant than they did assertions that the risks were insignificant.[15]

One of our major goals in this research was to determine whether media accounts of risk supplied the kinds of information that would help nonscientists accurately judge those risks. So, in addition to the literature focusing on descriptions of media content, we went to the social psychology literature about public perceptions of risk to identify informational strategies that seem to help laypersons make accurate judgments about risk. We have tried to discover from the literature which types of risk information the media might use to facilitate accurate public perceptions of risk. Learning whether the mass media employ these strategies may help researchers construct more concrete links between media accounts of and public attitudes toward risk.

The public risk perception literature makes a case for, among other things, two types of risk information that should enhance the ability of nonscientists to understand and to cope with the risk information conveyed:

*Presenting risk information in plain English. Altnough scientific risk estimates are highly quantitative, such estimates of mortality or hazard may not convey information appropriately to nonscientists.

Numbers aside, technical terminology can confound nonscientists as well. For example, a study by Murphy, Lichtenstein, Fischhoff and Winkler found that people were confused by probabilistic rain forecasts not because the forecasts used probability statements, but because they were uncertain about what the predicted event was. Does a 60 percent chance of rain mean (a) rain during 60 percent of the day, (b) rain over 60 percent of the area or (c) a 60 percent chance of rain at some particular

spot? Answer c is the correct interpretation, but few respondents in the study selected it.[17]

It is important for media accounts of risk to translate risk information into versions acceptable for public consumption. Translating strategies can include the use of definitions, analogies, comparisons, anything that might put technical data into context.

*Presenting several risk estimates, not just one. Fischhoff, et. al. argue that even experts rely on judgment when they assess risk, so it is possible for a bevy of experts to reach different conclusions using the same data set. Additionally, the authors note, people called upon to judge the quality of their own risk assessments "are overconfident when making such assessments."[18] Such confidence does not mean they are right. Thus, accurate representations of the risk of a scientific or technological phenomenon often require multiple risk estimates from a variety of credible sources.

We added two other conceptual elements to this analysis by examining the specificity of the risk assessments, and by determining whether media supply information about how risk assessments are derived. The first point was added to test the common assumption that media provide little risk data, but instead report reassuring or alarming general statements by officials. For example, The Media Institute's study of media coverage of chemical risks found that scientific data were used sparingly in stories.[19] The second point was added under the assumption that even nonscientists could better evaluate a risk assessment if they had some idea about how it was generated.

Background and Hypotheses

The focus of this study is media coverage of an accident that took place at the Robert E. Ginna nuclear power plant near Rochester, NY, on Jan. 25, 1982. The failure of a pipe in the steam generator forced the automatic shutdown of the plant and allowed a small amount of radioactive steam to escape into the atmosphere. Officials initially blamed "brittle pipes" for the accident, but they later reported that debris in the pipes left by repairmen had caused the damage.

In our content analysis of the coverage of the Ginna accident, we looked at the specificity of risk statements, whether the stories attempted to explain the risk assessment process and how journalists "translated" quantitative risk statements for lay readers. We also looked at the number of risk statements reported in individual stories and determined whether any risk statements beyond the original assessments supported or contradicted the original risk statements. We noted the types of sources utilized for risk statements, and we looked for risk information in headlines and in cutlines.

We also felt we might find variation in media treatment of risk across different types of media organizations. Since we studied both scientific and lay publications, we established hypotheses to that effect:

(1) Publications whose targeted audiences are more scientifically sophisticated will publish more: (a) specific risk assessment information, (b) contradictory or supportive risk assessment data, (c) multiple sources of risk assessment informa-

tion and (d) explanations of the risk assessment measurement process.

(2) Publications whose targeted audiences are less scientifically sophisticated will publish significantly more: (a) general risk assessment information, (b) risk assessments by experts or by nonexperts (termed "testimonials") and (c) translating strategies such as analogies, comparisons, examples.

Methodology

Publications in five categories were sampled: newsmagazines for scientists, popular science magazines, prestige newspapers, news magazines, and the five largest newspapers in two states: Texas and Wisconsin.[20]

The newspapers were analyzed for a one-week period following the accident on Jan. 25, 1982, at the Ginna nuclear power plant near Rochester, NY. The period studied was Jan. 25, 1982, through Feb. 4, 1982, which includes the time the accident was discovered, the time the NRC reported its preliminary findings about the accident and the week following release of the NRC report.

For the weekly magazines, the period examined was one month from the time of the accident at Ginna. For monthly magazines, the period was three months from the time of the accident.

Copies of all articles pertaining to the nuclear accident at Ginna were obtained and content analyzed by three coders.

Coders searched each sentence of each story for all variables specified in the research questions. The key variables were "risk," "risk estimation," "general risk statement" and "specific risk statement." For purposes of this study, the four variables were defined as follows:[21]

Risk: ". . .the potential for realization of unwanted, negative consequences of an event."[22] The consequences may be to human beings or to the environment.

Risk estimation: ". . .the identification of consequences of a decision and the subsequent estimation of the magnitude of associated risks."[23]

General risk statement: A general statement that excludes numbers, probability estimates and specific time estimates about a potential risk. For example, an accident at a nuclear power generating plant could cause cancer in an unspecified number of residents around the plant.

Specific risk statement: A specific statement that includes numbers, probability estimates and/or specific time estimations about a potential risk. This includes statements of association or correlation.

The overall intercoder reliability for 49 variables was 94.9%. Intercoder reliability also was computed for three variables for which reliability might have been low: presence of specific risk assessment data, presence of general risk assessment data and presence of information sources. Reliability for those three variables was 89.8%, 74.7% and 72.9%, respectively. Those were the lowest reliability figures obtained in this research.

Results

Seventy-six articles were published about the accident at the Ginna nuclear power plant by the sampled publications. Four were sidebars, and 72 were primary stories, as indicated in Table

1. Twenty-four articles were primary, "first day" stories, while 52 were follow-up, "second day" stories.

Most of the articles appeared in the 10 state newspapers sampled, as they published 36 stories. They were followed by prestige newspapers, 29 stories; scientists' magazines, seven articles; and popular science magazines and newsmagazines, two articles each.

Table 1 data showing the dates on which articles were published indicate that the Ginna nuclear accident story was not spread over many days. A third of the stories were published during the first two days following the accident. Sixteen stories (21.1%) were published the third day, and six stories (7.9%) were published the fourth day. Nearly two-thirds of all stories had been published by the fifth day of the story. Fourteen stories were published between Feb. 3 and April 30, 1982, but those apparently were published by magazines having longer lead times than newspapers and newsmagazines.

Nineteen stories were published on page one of the newspapers sampled, as shown in Table 1. Two were published on page one of inside sections. All other stories were published inside newspapers and in magazines.

Table 2 indicates that 12 stories contained specific, quantitative risk data, while 63 did not. Thirty-seven stories contained general, nonquantitative risk data, while 39 did not.

Five articles reported some risk assessment data in headlines, while 71 did not. In only one of the 24 stories that contained either photographs or illustrations (or both) did the article report any risk assessment data, as shown in Table 2.

No writer attempted to explain the process used to generate a risk assessment, as shown in Table 3.

Table 3 data also indicate that only three of the 39 articles that contained risk assessment information reported some criticism of the risk assessment. The criticisms focused on conclusions drawn and on the source of the risk estimate. Six articles did contain additional risk assessment data, as shown in Table 3, while 33 did not and 37 contained no risk assessment information at all.

Writers of these articles used few analogies, examples, comparisons or testimonials, as shown in Table 3. Not one writer used analogies or examples; 13 used comparisons; and three used testimonials to explain risk projections.

Table 3 shows that quantitative data were rarely reported in coverage of the Ginna accident. Only one article, in fact, reported only quantitative data, while 28 reported nonquantitative data and eight reported both quantitative and nonquantitative data. The quantitative data all were probability estimates of potential hazard.

Table 4 data show that 16 articles cited sources who helped prepare risk assessments; 23 publications did not cite those sources, and 37, again, reported no risk assessment data at all. Writers of two articles referred to sources who did not help with the original risk assessments.

Our study showed that most Ginna articles reported no supplemental risk information. Only two articles reported any contradictory assessments, and those came from advocacy organizations, as noted in Table 4.

Table 5 indicates that different kinds of publications indeed used different kinds of risk data. Specific risk information was used more frequently by scientists' magazines, which included it 33.3% of the time, than by other types of publications. Prestige newspapers included specific risk assessment information in 20.7% of their stories and state newspapers included it in 11.1% of their stories.

General risk assessment information was included more frequently by state newspapers, which included it 55.6% of the time, than by other types of publications. Prestige newspapers included general risk assessment information in 51.7% of their articles and popular science magazines included it in one of their two stories.

Newspapers used far more comparisons to make risk assessments clear to readers than did magazines, as Table 5 shows. Ten newspaper articles used comparisons, while two magazine articles used comparisons.

The one article that reported only a quantitative risk assessment was in a science magazine. Nine of the nonquantitative estimates were reported in newspaper articles; one was in a science magazine and one was in a popular science magazine.

Five newspaper articles reported quantitative and nonquantitative risk assessments; one science magazine article and two state newspaper articles reported both kinds of risk assessments.

Newspapers were a bit more careful to cite risk assessment sources than were magazines, as shown in Table 5. One magazine referred to a source, while three did not; 15 newspapers referred to sources, while 20 did not.

Follow-up stories tended to contain fewer risk assessment statements--of both the specific and general type--than original stories, as noted in Table 6. Of the initial stories, two contained specific risk assessment statements, while 19 of the follow-up stories contained general risk assessment statements.

Hypothesis 1--which suggested that publications whose targeted audiences are more scientifically sophisticated will publish more specific risk assessment information, contradictory or supportive risk assessment data, multiple sources of risk assessment information and explanations of the risk assessment measurement process--received mixed support.[24]

The prediction regarding specific risk assessment information was supported. Scientists' magazines published the largest number of specific risk assessment information. The prediction regarding multiple sources of information was not supported; in fact, the opposite was found. Prestige newspapers were the most likely to cite several sources for risk assessment information, followed by state newspapers. The parts of the hypothesis concerning contradictory or supportive risk assessment information and explanations of the risk assessment measurement process could not be tested here because neither of these kinds of information appeared in the sample.

Hypothesis 2--which suggested that publications whose targeted audiences are less scientifically sophisticated will publish more general risk assessment information, testimonial evidence of risk and translating strategies (such as analogies, comparisons and examples)--also received mixed support.

The prediction that general audience publications would contain more general risk assessment information was supported. The largest number of general risk assessment information was published by state newspapers, followed by prestige newspapers and then by popular science magazines. The number for scientists' magazines was lower than all of these.

The hypothesis that general audience publications would use more testimonials could not really be tested since there were only three testimonials in the entire sample. The testimonials did appear in articles in general audience publications--prestige newspapers--however, which is consistent with the hypothesis. The prediction that general audience publications would use more translating strategies could only be examined for the strategy of using comparisons, since there were no analogies or examples and few testimonials in the sample. Contrary to the hypothesis, articles in scientists' magazines used comparisons with greater frequency than the publications aimed at general audiences.

Conclusions

This study examined press coverage of the Ginna nuclear power plant accident in 1982 in five different types of publications--scientists' magazines, prestige newspapers, news magazines, popular science magazines and state newspapers.

In general, the 76 articles analyzed here contained few specific risk estimates; the more common pattern was to report general risk statements. Few offered multiple estimates of the health risks of the Ginna accident, and none of the articles explained how the risk estimates were derived.

It does seem, however, that if a medium offered a specific risk estimate--in this case an estimate of the likelihood of harm from the accident's radiation release--it attempted to make that estimate useful to readers by using a translating stategy; that is, oy using a technique that allows readers to "see" and to understand a risk assessment more readily. Journalists often use analogies, examples, comparisons and testimonials to translate difficult scientific concepts into terms that are relatively easy to understand. In almost all the cases with Ginna, the translating stategy was a comparison: comparing the radiation release from the plant to the radiation delivered by a chest x-ray, for example.

Results supported only some of our expectations about differences between types of publications. As we expected, publications whose audiences are more scientifically sophisticated printed more specific (quantitative) risk assessment information than publications aimed at general audiences.

And, also as we expected, publications aimed at general audiences published more general (nonquantitative) risk assessment information than publications aimed at scientifically-trained audiences. These findings probably reflect a tendency of journalists writing for the general public to avoid quantitative risk statements and to attempt to use other means of explaining risk assessments.

Contrary to our expectations, articles in scientists' magazines used comparisons with greater frequency than those in publications aimed at general audiences. This finding should be

viewed with some caution, however, since it is based on data obtained from only three scientists' magazines.

Also contrary to our expectations, the study found that scientific publications are no more likely than nonscientific publications to cite sources for risk assessment information. This may reflect the well-known tendency of mass media journalists to cite authoritative sources, while writers in magazines for scientists might have more technical training or background and might feel more free to discuss risk without quoting expert sources.

Only three stories contained criticism of the risk assessments presented by officials. Two of them were the same Associated Press story that quoted Peter Anderson, a spokesman for Wisconsin's Environmental Decade, Inc. The third was an article in the Christian Science Monitor, which quoted Henry Kendall, chairman of the Union of Concerned Scientists. Both sources criticized officials for downplaying the possibility of future catastrophic accidents such as a meltdown. Neither source challenged the statements about health risks from the radiation that was released in the Ginna accident.

To some extent, the press was presented with, and passed on without challenge, the official version of the Ginna accident. Numerous quotations from officials were reassuring, but very general:

*"We are convinced the plant is safe."--John Oberlies, Rochester Gas & Electric vice president

*"We are convinced there are no health problems."--Oberlies

*"It might be expensive for the operator to clean up, but in terms of public health consequences, it was not very serious." --Harold R. Denton, director of the Office of Nuclear Regulation for the Nuclear Regulatory Commission

Other spokespersons tried to downplay the seriousness of the accident:

*This accident didn't come within a country mile of Three Mile Island."--Frank H. Orienter, RG&E executive

*"I couldn't even try to compare it to Three Mile Island. You would not really say this is an accident. It is a 'problem' and an 'occurrence.'"--Walt Martin, NRC spokesman

Some officials even tried to tell the press and the public what the "story" was:

*"Everything worked; that's the real story."--Orienter

It is interesting to consider these official remarks in light of the statement made by one NRC spokesman to the President's Commission on the Accident at Three Mile Island. NRC public information officer Ken Clark said that adopting an optimistic tone without actually lying is common to utility personnel throughout the country.[25]

Some of the general risk statements reported in the Ginna stories verge on cliches or platitudes, and it is interesting to note how similar some of them are to sample statements discussed by Gofman in a book published prior to the Ginna accident. Gofman writes:

> [O]ne is constantly bombarded with variants of the two following statements, in spite of an enormous body of scientific information proving them false.

1. "Oh, yes, ionizing radiation does indeed produce harmful effects, but only if the dose is very high. We do not know the effects of low-level radiation."

2. "There was a release of radiation today, but the amount was small, and no harm will be done to the public health."[26]

Only a few alternative voices were presented in the sample articles to challenge the official Nuclear Regulatory Commission and Rochester Gas & Electric line. Three articles quoted sources from Wisconsin's Environmental Decade, Inc., and the Union of Concerned Scientists. There was also an op-ed piece in the New York Times by Richard Udell, an associate of Ralph Nader, which focused on the dangers to steam generator repair workers--people who are called "jumpers" or "sponges" because they jump into hot zones to plug leaking pipes while soaking up radiation.

One of the clearest expressions of an alternative view came in the form of a testimonial from an area resident. A story in the Los Angeles Times contained these paragraphs:

"I've been pretty scared all day," said Rita Almy, who said she, her husband and their three children planned to stay with relatives.

She said she found the official bulletins less than reassuring. "I don't think there's anything minor when radiation is involved," she said.

Most articles reported the official NRC and RG&E figure for released radiation, which was about three millirems at the plant boundary. This was usually given meaning by comparisons such as the following:

*Exposure to a chest x-ray is about 20--AP story, Jan. 25

*A dose of 600,000 millirems is considered lethal--AP story, Jan. 25

*The average person throughout the country is exposed by natural background to about 100 millirems a year--the New York Times, Jan. 26

*NRC guidelines call 1,000 millirems a "threshold for action"--Los Angeles Times, Jan. 26

*"Three millirems is less than the amount of radiation a person would pick up flying from New York to London and back"--Los Angeles Times, Jan. 26

Not one article mentioned how radiation levels were measured around and at the Ginna plant, or how the "safe" levels for radiation exposure have been determined. This omission implies that the techniques for measuring radiation are so standardized that there couldn't be any problem with them, and that the standards for safe levels of radiation are universally accepted, much like the levels for blood pressure readings that are considered normal. Similarly, not one story reported any contradictory risk assessment data.

The reader--even one who read widely from a number of these printed sources--would be left with the impression that there are universally accepted safe levels of radiation, when in fact some experts believe the standards should be lowered still further[27] and others believe there is no safe level for exposure to radiation.[28]

Examination of the press coverage of the Ginna accident suggests that there were actually three different kinds of risk involved:

*The risk of immediate death or injury.

*The risk of delayed death or injury, particularly through leukemia or some other form of cancer that might take 20 years to develop.

*The risk of other accidents at Ginna or at other nuclear power plants that might be worse than this one.

The discussion of risks from the Ginna accident by officials seemed to focus on the first risk and the third risk, and essentially to ignore the second risk. The press echoed this interpretation. Even the critics from environmental and advocacy groups contributed to this interpretation of the Ginna accident, since their criticisms focused on the third kind of risk. And yet, the second kind of risk might have been the most real and the most serious of the three.

The following are three questions about the Ginna accident that reporters might have asked officials, but, judging from our sample of articles, did not:

*If the radiation level was three millirems at the boundary of the plant, what was it beyond the boundary of the plant? (A few stories did report "traces" of radiation were found outside the plant. But what's a "trace"?)

*What portion of the population was exposed to radiation, and to how much radiation was it exposed?

*Some scientists say there is no safe radiation level. What are likely to be the longterm effects of this accident on the incidence of leukemia and other forms of cancer among the public?

On the basis of this study, the following recommendations are suggested for improving the reporting of risks associated with a nuclear plant accident:

*General audience publications should use more translating devices in reporting risk to the public. This means using more analogies, examples, comparisons and testimonials.

*Testimonials may be a particularly useful translation device if used with care. Coming from officials or scientists, testimonials can help to clarify a technical risk statement and put a danger in perspective. Coming from ordinary citizens, they can provide an alternative view to the official nuclear power industry line. Testimonials are often emotionally charged, however, and can make an aberrant point of view seem stronger than it actually is.

*A comparison, though it can be a useful translating device, should be looked at carefully. In the Ginna accident, comparisons apparently were used by officials to play down the danger from the plant. The amount of radiation was said to be less than that which one would get from a chest x-ray--but, of course, many people try to avoid having many medical x-rays because of the uncertainty of their long-term effects. Additionally, that particular comparison ignores the difference between a voluntary exposure (a chest x-ray) and an involuntary one (an accidental radiation release from a power plant).

*Some explanation should be given of how risk assessments are made. In the Ginna coverage, writers could have helped the public by discussing how the "safe" levels of exposure to radiation for human beings have been determined. This seems particularly important if there is some disagreement about what these levels are, or if standards have been changed over time. Both of these are true for levels of exposure to radiation.

*Reporters should try to penetrate beyond the official line in covering nuclear power plant accidents. One way to do this is to ask officials to be more specific when they make general risk statements that are really little more than platitudes and cliches. Another way is to get information from alternative sources.

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General science magazines were: Science News, Science Digest, Science 82, Natural History, Smithsonian, Technology Review, Mosaic, National Geographic, Popular Science, Omni and Psychology Today.

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The newsmagazines were Time, Newsweek and U.S. News & World Report; the Wisconsin newspapers were the Eau Claire Leader-Tribune, Green Bay Press Gazette, Milwaukee Sentinel, Post Crescent of Appleton and Wisconsin State Journal of Madison; and the Texas newspapers were the Houston Chronicle, Dallas Morning News, Houston Post, Dallas Times Herald and San Antonio Express-News.

[21] Space does not permit a listing of all definitions used in this study. They are available on request, however.

[22] W.D. Rowe, An Anatomy of Risk (New York: John Wiley & Sons, 1977), p. 25.

[23] Ibid.

[24] Statistical significance tests were not used in this research because of the extremely small number of cases in some cells and because cell sizes were unequal.

[25] David M. Rubin, "The Public's Right to Know: The Accident at Three Mile Island," in David L. Sills, C.P. Wolf and Vivian B. Shelanski, eds., Accident at Three Mile Island: The Human Dimensions (Boulder, Colo.: Westview Press, 1982), p. 135.

[26] John W. Gofman, Radiation and Human Health (San Francisco: Sierra Club Books, 1981), pp. 5-6.

[27] Ralph Nader and John Abbotts, The Menace of Atomic Energy (New York: W.W. Norton, 1977), pp. 69-73.

[28] George R. Zachar, "Radiation Explained," in Lee Stephenson and George R. Zachar, eds., Accidents Will Happen: The Case Against Nuclear Power (New York: Harper & Row, 1979), p. 148; Gofman, op. cit., p. 411.

TABLE 1

Types of Articles and Names, Types, Dates, Page Numbers of Publications in which Articles Appeared

	N	%
Type of Publication		
Scientist's Magazine	7	9.2
Popular Science Magazine	2	2.6
Prestige Newspaper	29	38.2
State Newspaper	36	47.4
Newsmagazine	2	2.6
Article Type		
Initial	24	31.6
Follow-up	52	68.4
Dates of Publication		
Jan. 25, 1982	4	5.3
Jan. 26, 1982	23	30.3
Jan. 27, 1982	16	21.1
Jan. 28, 1982	6	7.9
Jan. 29, 1982	1	1.3
Jan. 30, 1982	2	2.6
Jan. 31, 1982	2	2.6
Feb. 1, 1982	3	3.9
Feb. 2, 1982	5	6.6
Feb. 3-April 30, 1982	14	18.4
Sidebar		
Yes	4	5.3
No	72	94.7

TABLE 1, continued

Page Number of Publication		
One (Newspapers)	19	26.0
Inside Pages (Newspapers)	41	56.2
Page One, Inside Section (Newspapers)	2	2.7
Inside Pages (Magazines)	11	15.1

TABLE 2

Presence of Risk Assessment Data in Articles, Headlines, Illustrations, Cutlines

	N	%
Specific Risk Data in Article		
Yes	12	16.0
No	63	84.0
General Risk Data in Article		
Yes	37	48.7
No	39	51.3
Risk Data in Headline		
Yes	5	6.6
No	71	93.4
Art with Article		
Photographs	7	9.3
Illustrations	7	9.3
Photographs and Illustrations	10	13.3
None	51	68.0
Art Explained by Cutlines		
Yes	11	14.7
No	13	17.3
Not Applicable	51	68.0
Cutlines Contain Risk Data		
Yes	1	1.3
No	9	12.0
Not Applicable	65	86.7

TABLE 3

Risk Elements Mentioned in Articles

	N	%
Article Explains Process of Risk Assessment		
Yes	-	-
No	39	51.3
Not Applicable	37	48.7
Article Contains Criticism of Risk Assessment		
Yes	3	3.9
No	36	47.4
Not Applicable	37	48.7
Elements of Risk Assessment That Are Criticized		
Source of Estimate	-	-
Way Data Were Gathered	-	-
Conclusions Drawn	2	2.6
Source of Estimate and Conclusions Drawn	1	1.3
Not Applicable	37	48.7
Article Contains Additional Risk Assessment Data		
Yes	6	7.9
No	33	43.4
Not Applicable	37	48.7
Article Contains Contradictory Risk Assessment Data		
Yes	-	-
No	39	51.3
Not Applicable	37	48.7

TABLE 3, continued

Article Contains Supportive Risk Assessment Data		
Yes	-	-
No	39	51.3
Not Applicable	37	48.7
Article Contains Analogy		
Yes	-	-
No	36	47.4
Not Applicable	40	52.6
Article Contains Example		
Yes	-	-
No	37	49.3
Not Applicable	38	50.7
Article Contains Comparison		
Yes	13	17.1
No	24	31.6
Not Applicable	39	51.3
Article Contains Testimonial		
Yes	3	4.0
No	33	44.0
Not Applicable	39	52.0
Type of Risk Assessment Described in Article		
Quantitative	1	1.3
Nonquantitative	28	36.8
Quantitative and Nonquantitative	8	10.5
Not Applicable	39	51.3

TABLE 3, continued

Type of Quantitative Estimate Expressed in Article		
Probability Estimate (Mortality)	-	-
Probability Estimate (Hazard)	4	5.3
Environmental Impact Estimate	-	-

TABLE 4

Information Sources Cited in Articles

	N	%
Article Cites Sources Who Helped Prepare Risk Assessment		
Yes	16	21.1
No	23	30.3
Not Applicable	37	48.7
Sources for Contradictory Risk Assessment Data		
Government	-	-
Academic Organizations	-	-
Industry Organization	-	-
Advocacy Organization	2	2.6
Journalist	-	-
Unaffiliated Individual	-	-
Sources for Supportive Risk Assessment Data		
Government	-	-
Academic Organization	-	-
Industry Organization	-	-
Advocacy Organization	-	-
Journalist	-	-
Unaffiliated Individual	-	-
Sources of Complaints About Risk Assessment Data		
Government	-	-
Academic Organization	-	-
Industry Organization	-	-
Advocacy Organization	-	-

TABLE 4, continued

Journalist	-	-
Unaffiliated Individual	-	-
Sources for Assessment Data Beyond Those Reported in Original Projection		
Government	-	-
Academic Organization	-	-
Industry Organization	-	-
Advocacy Organization	-	-
Journalist	-	-
Unaffiliated Individual	-	-

TABLE 5

Five Variables Broken Down by Publication Type

	Publication Type				
	Science Mag	Prestige Nsp	News Mag	Popular Science Mag	State Nsp
Article Contains Specific Risk Information					
Yes	2	6	-	-	4
No	4	23	2	2	32
Article Contains General Risk Information					
Yes	1	15	-	1	20
No	6	14	2	1	16
Article Contains Risk Comparisons					
Yes	2	5	-	-	6
No	1	9	-	1	13
Type of Risk Assessment Mentioned in Article					
Quantitative	1	-	-	-	-
Nonquantitative	1	9	-	1	17
Quantitative and Non-quantitative	1	5	-	-	2
Article Cites Source					
Yes	1	8	-	-	7
No	2	7	-	1	13

Note: Frequencies, rather than percentages, are reported here because of the small Ns in several cells.

TABLE 6

Use of Specific, General Risk Assessment

Data by Article Type

	Article Type	
	Initial	Follow-up
Article Contains Specific Risk Information		
Yes	10	2
No	13	50
Article Contains General Risk Information		
Yes	18	19
No	6	33