Framing Science: The Influence of Expertise and Jargon in Media Coverage

DESERAI ANDERSON CROW

Environmental Studies
University of Colorado Boulder
1511 University Ave., 478 UCB
Boulder, CO 80309
USA
deserai.crow@colorado.edu

J. RICHARD STEVENS

Journalism and Mass Communication
University of Colorado Boulder
1511 University Ave., 478 UCB
Boulder, CO 80309
USA
rick.stevens@colorado.edu

ABSTRACT: The authors use an experimental pilot survey to examine the effects of message framing on a local environmental topic—urban development. Researchers focus on liberal respondents and find that scientists are considered the most credible sources of environmental information. However, some respondents appear less likely to agree that the inclusion of scientific information or jargon increases a news story’s credibility or persuasiveness. The paper then discusses the significant potential implications that the findings have for public deliberation and the role of experts in public discourse.

KEYWORDS: environment, expertise, framing, jargon, science.

1. INTRODUCTION

Recent studies indicate that Americans are interested in but uninformed about science (National Science Board, 2010; Pew Research Center for the People and the Press, 2009) and that they get the majority of their information about science from the media (Pew Research Center for the People and the Press, 2002). Though the press plays a critical role in the public communication of science, scientists and media scholars often malign news media for an inability to cover science and complex environmental topics accurately (Pew Research Center for the People and the Press, 2009; Tankard & Ryan, 1974). These deficiencies are compounded by the economic issues imposed upon traditional news media over the past decade, and the resulting resource crisis that exists among American newspapers (Meyer, 2009). Even television news experienced an observable decline in dedicated coverage of science and environmental topics, despite relatively healthier profits (Brainard, 2008).

This paper draws from an online quasi-experimental survey designed to examine the effects of message framing (the use of technical and non-technical information) on a local environmental topic—urban air pollution.
2. COMMUNICATING TECHNICAL INFORMATION AND POLICY IMPLICATIONS

As environmental problems grow increasingly difficult to solve (Vig & Kraft, 2003), examination of the role that science and environmental communication plays in the formation or change of opinions, knowledge, and policy becomes critical. In the deficit model of communication, scholars generally assume that citizens who possess more knowledge participate more fully in the policy process, policies are better informed, and democratic deliberation is better served. One hurdle to achieving the public awareness of environmental problems is the challenge journalists face in effectively communicating complex ideas to the public. Such efforts are increasingly important because “the public may be highly susceptible to influence by changes in media attention and media characterization” of scientific issues (Nisbet, 2004, p. 139).

One important issue concerns whether news media coverage of technical issues more effectively informs individuals through specific reporting of scientific facts or through more generalist narrative treatment of the issues. The increased complexity of a modern “knowledge society” (Giddens, 1990) and the increased centrality of science and technology (Lane, 1966) demands that journalists consult and interpret expertise in order to explain complex issues to the public.

2.1. Science Journalism in America

Americans are “knowledgeable about basic scientific facts that affect their health and their daily lives,” topics widely covered by mainstream media (Pew Research Center for the People and the Press, 2009, p. 8), but are much less informed about more complex scientific topics (National Science Board, 2010). Despite high levels of science interest among Americans (National Science Board, 2010; Nunn, 1979; Pew Research Center for the People and the Press, 2009), news organizations tend to relegate science to a niche or beat subject, leading to uneven coverage by beat reporters, general assignment reporters, and wire stories (Friedman, 1986). The 1980s saw an increase in the number of science newspaper sections (Lewenstein, 1987), but the number of sections later declined from 95 sections in 1989 to 47 in 1992 (Jerome, 1992).

The Pew Research Center found in 2002 that Americans acquired 89 percent of their science and technology information from news media (Pew Research Center for the People and the Press, 2002). By 2010, “television and the Internet are the primary sources Americans use for science and technology information,” with the Internet serving as the primary source for information about climate change (National Science Board, 2010, pp. 7–4). The Pew Center (Pew Center for the People and the Press, 2004) also found that 80 percent of the journalists surveyed reported media were not paying enough attention to complex stories, and half were pessimistic concerning the general state of journalism. While the Pew studies found television as one of the most important sources of science information, Sachsman, Simon and Valenti (2006) found that newspapers employed more than six times the environmental reporters. While nearly half of newspapers employed at least one environmental reporter, only 12.9 percent of television stations did.

Several past studies examined the accuracy of scientific news reports. Despite the public’s positive attitude towards science, scientists overwhelmingly report dismay at public knowledge of science and blame the news for inadequately covering the issues (Pew Research...
Center for the People and the Press, 2009). Tankard and Ryan (1974) found that scientists judged only 8.8 percent of science articles to be error-free, compared to 40 to 59 percent error-free in other types of stories. Studies repeatedly show scientists judging media reporting on science topics as inaccurate and distorted (Dunwoody & Scott, 1982; Tichenor, Olien, Harrison, & Donohue, 1970). Few science journalists possess scientific expertise (Palen, 1994), primarily because only three percent of journalists with college degrees major in mathematics or science areas, while most major in communication fields (Weaver & Wilhoit, 1996).

Beyond issues of whether scientific information is reported in media, and whether reportage is accurate, emerges the question of how reporters cover complex topics. Previous studies indicate the most compelling way in which reporters cover complex issues—whether they include science, economics, or other complexities—is through narrative use. Narratives feature compelling characters and typically possess a clear beginning, middle, and end, often with a villain, victim, and hero (Shanahan, Jones, & McBeth, 2011; Shanahan, McBeth, & Hathaway, 2011; Stone, 1997). Narrative structures have been reported the most effective in changing opinion, communicating information, or making people care about a topic (Golding, Krimsky, & Plough, 1992; Jones, 2010; Stone, 1997). Similar narrative strategies are also used by policy stakeholders to change public opinion regarding policy questions (McBeth & Shanahan, 2004; McBeth, Shanahan, Tigert, Hathaway, & Sampson, 2010).

Narrative strategies, however, can misinform the public with regard to broader policy problems, implications, causes, and consequences of policy action. By focusing on a single case (episodic framing), at the expense of the broader picture (thematic framing), media consumers often blame the victims for their plight instead of engaging broader societal trends and issues (Iyengar, 1990; Iyengar & Kinder, 1987). Thus, reporters can perform a disservice simply by attempting to tell a story using common journalistic norms of personification and localization of broad stories (Graber, 2006).

2.2 The Role of Expertise and Jargon in Science Communication

Expertise is an important factor in the communication of science, technology, and environmental events and issues. Expertise generally refers to skills or prowess, but is more often seen in communication research as a vehicle for creating authority or credibility (Hartelius, 2011). Journalists rely on scientific experts for context, legitimization, explication, and balance (Conrad, 1999).

Studies of expertise have reported expert sources in news stories had a strong positive impact on viewers’ opinion change (Page, Shapiro, & Dempsey, 1987). Cozma (2006) found that stories containing a mix of expert and government sources were perceived more credibly than those including only government sources. Expertise uses are on the rise: a survey of newspaper stories from 1990 found twice as many experts quoted compared to 1978 (Soley, 1992).

One marker of expertise that often creates barriers to the public’s understanding of science is the use of jargon. Jargon is essential for designating new entities for which the language has no name, producing an economy of effort and the accuracy and precision required in scientific research (Wilkinson, 1992). However, jargon does not always assist the communication process:
Jargon has several meanings, one of which is neutral and the other negative. Neutrally defined, it refers to the “technical terminology or characteristic idiom of a special activity of group”; its negative definition refers to the inappropriate use of “obscure and often pretentious language marked by circumlocutions and long words.” (Rowan, 1989, p. 171)

Jargon can also provide an air of technical or scientific authority while making the concepts referred to inaccessible to non-specialists. Such examples are said to be “mystificatory in aim and power-building in effect” (Fowler & Marshall, 1985, p. 3). Journalists appear to favor science sources that limit jargon and frame science in easily communicated terms (Conrad, 1999), even though they themselves often use jargon to demonstrate their scientific proficiency (Berglez, 2011). As for consumers, they cannot directly access the technical knowledge of experts (Goodwin, 2011).

Science writers generally believe that defining scientific terminology is important to reducing public confusion about science and medical stories (Cooper & Yukimura, 2002), and particularly in environmental stories (Wigington, 2008), as well as risk-related stories (Jardine & Hrudey, 1997). But detailed scientific terminology is often perceived as a barrier to public understanding (De Boer, McCarthy, Brennan, Kelly, & Ritson, 2005).

Jargon often impedes public discourse about science or policy (Sandrelli, 2008) and reduces reader interest (Steinke, 1995). In policy research, the use of jargon often keeps the public confused, anxious about complexities, and uninvolved in the policy process (Schneider & Ingram, 1997).

2.3 Informed Citizens, Jargon, and Experts

Public opinion models indicate the presence of two separate publics—one with highly informed opinions and the other with less predictable and less-formed opinions (Zaller, 1992). The highly informed public is more likely to have access to information, education, and resources that influence their opinions. When such individuals are grouped, one expects higher education, greater employment, and more resources available (Brady, Verba, & Schlozman, 1995). Similarly, the individuals expected to most support environmental causes generally self-identify as liberal, educated, and having more resources (Dunlap & Mertig, 1992). Higher education levels suggest these individuals face lower comprehension barriers to complex scientific information than less-educated individuals. The question, then, becomes to what degree these highly educated individuals can synthesize technical information and whether technical information plays a role in opinion change.

Hartelius (2011) explained that “scientese” performed different roles for different audiences (p. 106). While internally jargon serves as an authenticator for scientific and professional communities, to outward audiences it can actually impede the persuasiveness of an expert’s message.

Based upon the literature, the following research questions and hypotheses were developed for this study. Wondering whether Hartelius’s observation was true only for the public at large, this study focused on higher-educated liberals.

• R1: Does the presence of jargon in media coverage of science topics inhibit or enhance understanding of the concepts presented?
  o H1: The use of jargon, when presented to educated liberals, will not inhibit understanding of the concepts presented.
3. SURVEY RESEARCH METHODS

The study drew from an online quasi-experimental survey administered in July 2011. Subjects responded to social media advertising directed at Colorado residents. This paper focuses on research questions related to the liberal ideological and education demographics (N=108). While the response rate was low, the findings provide insight into barriers to the communication of expert information. The survey design presented a series of opinion and knowledge questions focused on broad ideological positions as well as specific environmental and media-related questions. Subjects were randomly assigned to a group (two treatments and a control), each receiving a news article “treatment” (the treatments appear in the appendices below). The news article reported on the heat island effect on urban air pollution in Colorado. The control group received the survey questions but not the news article. Treatment 1 received a jargon-laden article, while treatment 2 received an article with a more lay presentation of the issues. The articles were of similar length (231 words in treatment 1 and 269 words in treatment 2). To avoid conflation with findings involving narrative language (Golding, et al., 1992; Jones, 2010; Stone, 1997), this study avoided narrative storytelling techniques to focus on the role of jargon and portrayals of expertise in media coverage of science and environmental topics.

4. RESEARCH FINDINGS

From the survey data, the respondents reported overwhelmingly (94.3%) that scientists were the most credible source for environmental stories. When asked for the second most credible sources, environmental activists (61.1%) were rated highly. When asked which sources were the least credible, the respondents reported industry representatives (36.8%), clergy (31.1%) and celebrities (29.2%) were least credible sources on environmental issues. Given the progressive ideological bias inherent in the selected sample, these results conformed to the researchers’ expectations.

The researchers expected a more technical presentation of scientific research findings, in this case related to air pollution, would not present a barrier to comprehension for the sample surveyed.

- H1: The use of jargon, when presented to educated liberals, will not inhibit understanding of the concepts presented.
Indeed, as Table 1 illustrates, there was no correlation between treatment group and the measures of knowledge tested in the survey. Hypothesis one is therefore supported by the data.

Table 1: Correlations: Treatment Group and Knowledge Measures

<table>
<thead>
<tr>
<th></th>
<th>Article Knowledge</th>
<th>Non-attainment Knowledge</th>
<th>EPA Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>-.129</td>
<td>-.142</td>
<td>-.019</td>
</tr>
</tbody>
</table>

Second, it was expected that liberals would place high value on scientific information and therefore, the inclusion of jargon would sway their opinions to support pro-environmental policies and statements.

- H2: The use of jargon, when presented to educated liberals, will increase support for policies or positions relevant to the science presented.

Hypothesis two was not supported by the data, showing no correlation between the presence of scientific data and significant differences with the opinion measures.

Table 2: Correlations: Treatment Group and Pollution Opinions

<table>
<thead>
<tr>
<th></th>
<th>Agreement Urban Growth Limits</th>
<th>Agreement Gasoline Additives</th>
<th>Agreement Clean Air is Important</th>
<th>Agreement Regulate Business for Environment</th>
<th>Agreement Regulate Business for Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>-.112</td>
<td>.003</td>
<td>.153</td>
<td>.029</td>
<td>.024</td>
</tr>
</tbody>
</table>

Third, it was expected that liberals would assign a high level of credibility to scientific sources and that the use of technical information to tell a news story would increase its credibility.

- H3: The presence of technical science information, when presented to educated liberals, will lead to reader assignment of higher levels of credibility of science and scientists than non-technical presentations.

Hypothesis three was not supported by the data. There was no significant correlation between treatment group and respondents’ likelihood of assigning higher levels of credibility to scientific data generally, or to specific sources—both scientific and non-scientific. The presence of scientific data did not seem to influence opinions of credibility of science or news sources.

Table 3: Correlations: Treatment Group and Assigned Credibility of Scientific Data

<table>
<thead>
<tr>
<th></th>
<th>Scientific findings are generally credible</th>
<th>Data improve credibility of story</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>-.003</td>
<td>.083</td>
</tr>
</tbody>
</table>

DESERAI A. CROW & J. RICHARD STEVENS
Table 4: Correlations: Treatment Group and Assigned Credibility of Sources

<table>
<thead>
<tr>
<th>Source Type</th>
<th>Group</th>
<th>Industry Representatives</th>
<th>Scientists</th>
<th>News Media</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Activists</td>
<td>.001</td>
<td>-.022</td>
<td>-.038</td>
<td>-.086</td>
</tr>
<tr>
<td>Industry Representatives</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientists</td>
<td>-</td>
<td>.002</td>
<td>.017</td>
<td>.986</td>
</tr>
<tr>
<td>News Media</td>
<td>-</td>
<td>.301</td>
<td>.022</td>
<td>.038</td>
</tr>
</tbody>
</table>

Finally, linear regression analysis was conducted to determine the influence of treatment group and demographic variables on the assignment of source and scientific credibility. Table 5 indicates that while the model helps explain a relatively low amount of the variance in credibility assignment ($R^2=.140$), the treatment group only explains a small amount of this variance.

Table 5: Linear Regression Analysis for Influence of Treatment and Demographics on Credibility (N=108)

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE(B)</th>
<th>β</th>
<th>t</th>
<th>Sig. (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment Group</td>
<td>.005</td>
<td>.301</td>
<td>.002</td>
<td>.017</td>
<td>.986</td>
</tr>
<tr>
<td>Gender</td>
<td>-.174</td>
<td>.299</td>
<td>-.070</td>
<td>-.582</td>
<td>.562</td>
</tr>
<tr>
<td>Age</td>
<td>-.025</td>
<td>.012</td>
<td>-.255</td>
<td>-2.14</td>
<td>.036</td>
</tr>
<tr>
<td>Education</td>
<td>-.199</td>
<td>.114</td>
<td>-.217</td>
<td>-1.75</td>
<td>.086</td>
</tr>
<tr>
<td>Income</td>
<td>.159</td>
<td>.065</td>
<td>.312</td>
<td>2.46</td>
<td>.017</td>
</tr>
</tbody>
</table>

Note: $R^2=.140$.

The researchers therefore conclude that for the sample surveyed in this study, consumption of news information with or without data and jargon do not produce significantly different opinions regarding the credibility of science or scientific and non-scientific news sources. Similar tests conducted to determine the influence on knowledge and opinion resulted in even lower regression coefficients.

5. DISCUSSION

The results contain important implications for understandings of science communication and its effects on opinions, knowledge, and the trust or credibility of scientific sources. If news consumers show aversion to the language of scientific information and therefore do not receive the news content, this content cannot inform their opinions or political and personal decisions.

The presentation of technical information did not decrease understanding of the article content. However, the use of science in the news article did not affect opinion change, or the trust respondents reported for scientific sources of information. Previous studies (Page, Shapiro, & Dempsey, 1987; Cozma, 2006) consistently find that the presence of science sources in stories raise the claim credibility of scientific statements. The current study suggests
this effect is more a judgment of status than performance, particularly since more detailed information does not increase message persuasiveness. Perhaps Goodwin’s (2011) finding that consumers cannot directly assess technical knowledge themselves suggests the role of scientific expertise relies more on image than substantive claims.

Previous studies indicate that educated liberals place a higher degree of trust in science, sufficient to elicit a change of opinion. The failure to support H2 and H3 suggests the relationship of the technical parts of the message are more complicated than originally supposed, perhaps serving as more of a reinforcement of pre-existing ideological positions than a factor in opinion change.

Given that the use of jargon and data does not increase persuasiveness among those predisposed to a liberal political views, the tendency for those elements to impede discourse in the populace at large (Sandrelli, 2008) suggest their usage is not justified when the communication goal is to inform or persuade. Jargon itself may increase the credibility of the individual expert source through the “mystificatory” function (Fowler & Marshall, 1985), but such credibility does not appear to extend to the message or its content.

6. CONCLUSION

This study challenged earlier understandings of the role of expertise in the public communication of science. Specifically, by attempting to separate the role of the expert source from the expert language utilized, the study sought to glean insight into what elements of expert sourcing increase credibility and persuasiveness of a topic or issue.

The study also attempted to test the general findings from the literature regarding general populations against a sample predisposed to embrace science as authoritative. The results suggest that the politically liberal pro-science bias might be more superficial than substantive, as respondents did not appear motivated by detailed scientific information.

Due to sample limitations, the authors recommend the expansion of this inquiry to a national and representative sample in order to adequately understand whether these findings are generalizable to the population, or merely a function of preconceived views serving as a function of ideology. In particular, one would expect that the presentation of highly technical information would increase barriers to comprehension among the general public. One would also expect that among some demographics, a reliance on science as a primary news source may decrease the influence that a news article has on individual opinions or knowledge formation. It is important to next pursue studies that attempt to measure these effects within a broader sample.

Additionally, as stated above, it is evident from this study that among this presumably science-friendly audience, knowledge barriers were not evident. However, opinions were also not changed by the scientific data presented. Future research should combine analyses of technical information in news sources along with narrative framing studies to measure more discretely the most effective combination of the two approaches when attempting to shift opinion among media consumers. This information could provide both communicators and policymakers with a valuable source of information regarding teaching and persuading constituents about important, but highly technical issues.
REFERENCES


APPENDIX A: NEWS ARTICLES USED IN QUASI-EXPERIMENTAL SURVEY DESIGN

*Treatment 1: Technical science*

Urban development linked to pollution concentration

By Steve Riggs

Widespread urban development results in a significant increase in ambient particulates accumulated during summer on paved surfaces, rather than being distributed across significant regions, says a new study.

The reason for this is that the proliferation of strip malls, subdivisions and other paved areas may cause a significant decrease in the evening breezes.

The international study, led by the National Centre for Atmospheric Research (NCAR) in the US, could have implications for the air quality of fast-growing coastal cities and other mid-latitude regions globally, the Journal of Geophysical Research-Atmospheres reports.
For instance, paved surfaces, a consequence of worldwide urbanization, keep the city warmer than more natural surfaces, according to an NCAR statement. "The paved surfaces in metro Denver can trap as many as 19 extra joules of heat per square meter," said NCAR scientist Fei Chen, who led the study. This difference lowers the contrast between high and low elevated area temperatures and causes an average 7 mph reduction in nighttime winds.

The stagnant conditions persist during the day because of larger-scale wind patterns. "If the city continues to expand we’re going to hit the 35 micrograms per cubic meter limit set by the Environmental Protection Agency around 2014," he added.

The research team combined extensive atmospheric measurements with computer simulations to examine the impact of pavements on the breezes in the area.

Treatment 2: Lay-science

Urban development linked to pollution concentration
By Steve Riggs

Widespread urban development alters weather patterns in a way that can help pollution accumulate during summer on paved surfaces, rather than being dispersed over large areas, says a new study.

The reason for this is that the proliferation of strip malls, subdivisions and other paved areas may interfere with the breeze needed to clear away smog and other pollution.

The international study, led by the National Center for Atmospheric Research (NCAR) in the US, could have implications for the air quality of fast-growing cities and other mid-latitude regions globally, the Journal of Geophysical Research-Atmospheres reports.

For instance, paved surfaces, a consequence of worldwide urbanization, keep the city warmer than more natural surfaces, according to an NCAR statement.

Researchers found that because pavements soak up heat and keep land areas relatively warm overnight, the contrast between temperatures at different elevations is less during the summer. This, in turn, causes a reduction in nighttime winds.

Consequently, overnight temperatures are often similar between the city and nearby low areas, which weakens summertime breezes and enables air pollution to build up.

The stagnant conditions also persist during the day because of larger-scale wind patterns. "The developed area of Denver has a major impact on local air pollution," said NCAR scientist Fei Chen, who led the study.

"If the city continues to expand, it's going to make the winds even weaker in the summertime, and that will make air pollution much worse," he added.

The research team combined extensive atmospheric measurements with computer simulations to examine the impact of pavements on the breezes in the area.