

# Merging content analysis and the policy sciences: A system to discern policy-specific trends from news media reports

Dave Howland · Mimi Larsen Becker ·  
Lawrence J. Prelli

Received: 6 June 2005 / Accepted: 11 October 2005  
© Springer Science + Business Media B.V. 2006

**Abstract** In this article we set out to bridge a surprising methodological gap between two time-honored research traditions – news media content analysis and the policy sciences analytic framework. Lasswell, a recognized pioneer of both the method and the framework, discussed the mutual benefits of each decades ago. But few researchers, if any, have formally linked the two. To that end, in this article we (1) make the case for using news media content analysis to inform research studies using the policy sciences analytic framework; (2) introduce an original content analysis categorical system for that purpose; (3) demonstrate that system with a study of 90 national news articles about the stratospheric ozone hole; and (4) compare our system to others used to examine news content. We report that our system, used by human coders, is well geared to describing and mapping trends in the social process surrounding the development of the Montreal Protocol ozone treaty during the intelligence gathering and promotion phases encompassed by our data sample. We argue that other content analysis systems fall short – in structure and purpose – of meeting the promise ours holds to the policy scientist.

**Keywords** News media · Montreal Protocol · Policy sciences · Content analysis · Environmental policy · Ozone hole

## Overview

Harold Lasswell, whose varied contributions to the social sciences spanned many disciplines, is well known for his pioneering work on communication theory and quantitative content

---

D. Howland (✉)

Natural Resources and Earth System Science Ph.D. Program, University of New Hampshire  
e-mail: dhowland@cisunix.unh.edu

M. L. Becker

Natural Resources and Environmental Policy, Department of Natural Resources, University of New Hampshire

L. J. Prelli

Department of Communication, University of New Hampshire

analysis methodology (Danielson and Lasorsa, 1997; Lasswell, 1972, 1968; Neuendorf, 2002). Lasswell (1971) is also recognized for establishing the policy sciences analytic framework, described by Clark (2002: p. 4) as “a set of integrated concepts or conceptual tools for framing thought and action and for guiding analysis, interpretation and resolution of any problem.” Despite Lasswell’s renown for his work in both the communications and policy sciences fields, studies explicitly merging content analysis with the policy sciences framework – apart from Lasswell’s own writings – are hard to find. This methodological gap is surprising, given the utility of content analysis for policy research and the power of Lasswell’s policy sciences analytic framework, which welcomes the use of multiple methods.

The purpose of this article is to introduce an original content analysis categorical system designed to bridge that gap on at least one front, drawing upon one of Lasswell’s favorite data sources – the national news media (Danielson and Lasorsa, 1997). Geared to writing an immediate first draft of history, news accounts are rich in description about the present and they both reflect and influence public opinion and policy formation (Bengston et al., 1999; Huebner et al., 1997; Jamieson and Campbell, 1988; Lang and Lang, 1983; Nelkin, 1995; Neuendorf, 2002; Trumbo, 1995; Wanta et al., 2004). Our content analysis system – which produces maps of what we call the rhetorical landscape of policy formation – is designed to aid the policy scientist in the description of trends in social and decision processes surrounding a policy. Specifically, it enables human coders to do the following: identify arguments in news articles bearing upon a specific policy problem and solutions to solve it; assess the direction of the arguments relative to a specific set of policy goals and principles; categorize the content of the arguments; note the stakeholders linked to the argument; and sort the arguments for relevance to one or more of five dimensions of the policymaking process that we call policy issue criteria. We could find no content analysis methodology with similar structure or purpose and none that unified the above elements of coding for direction, substance, stakeholders and relevance to dimensions of the policy process.

Within the policy sciences analytic framework, recall that Clark (2002) defines social process as the interaction of individual and organized interests in society that form the context within which all policy problems exist. It includes an accounting of participants, their perspectives, situations, base values, strategies, outcomes and effects. The decision process comprises seven activities of decision making, including the gathering and processing of information (Lasswell’s intelligence gathering function) and the promotion of policies (the promotion function). To illustrate and test our method, we conducted a content analysis of 90 news articles about the stratospheric ozone hole written by the New York Times, The Associated Press and United Press International. We sought out and coded arguments relative to the goals and principles of the treaty forged to address the problem – the Montreal Protocol. We chose to examine the rhetorical landscape during the policy’s intelligence gathering and promotion phases and thus selected articles written between 1980 and 1987 – the year the protocol was adopted. Our content analysis was driven by four basic research questions enabled by our coding categories:

1. Are the arguments supportive or opposed to the goals and/or principles of the policy?
2. In what proportion are the arguments international or domestic, and economic, political, social or environmental in nature?
3. What stakeholder groups are the main sources/subjects of the arguments?
4. What are the arguments’ relevance to one or more of five policy issue criteria?

The answers to these questions provide a map that enables valuable understanding of the rhetorical structure and tenor of news reporting relative to the protocol. By analyzing

**Table 1** Overview of model

---

1.	Collect relevant news articles News accounts about a policy problem are collected using online databases. Studies show news media reports both reflect and influence public opinion and policy making.
2.	Code news articles <i>Through our categorical content system we:</i> <ul style="list-style-type: none"> <li>• Identify specific arguments relevant to a policy problem and solution to solve it</li> <li>• Code those arguments for direction relative to goals and/or principles of a specific policy</li> <li>• Describe the substance of those arguments</li> <li>• Identify stakeholders linked to those arguments</li> <li>• Match arguments to one or more of five dimensions of the policy process</li> </ul>
3.	Using coding results to inform elements of the policy sciences analytic model <i>Analyzing empirical coding data and content of coded arguments enables description of:</i> <ul style="list-style-type: none"> <li>• Social Process – (particularly) participants, perspectives, situations, base values and strategies</li> <li>• Decision process – (particularly) intelligence gathering and promotion</li> <li>• Trends – in each of the our content analysis categories and above policy sciences elements</li> </ul>

---

combinations of these variables and their evolution over time, we can relate mapped trends to social and decision processes surrounding the development of the protocol. As we shall show, maps of the rhetorical landscape can inform policy related decisions and processes. Table 1 provides an overview of our approach that can serve as a useful reference throughout the article.

We argue that our categorical system stands out in the content analysis literature as uniquely suited for our task of analyzing and describing policy-relevant news media accounts. We begin by showing the need for a categorical system that can help integrate content analysis methodology and the policy sciences. Second, we articulate that categorical system. Next, we report the results of our sample study using that system to address the four research questions outlined above. We then discuss the advantages and limitations of our proposed system for informing policy analysis using the policy sciences analytic framework.

### Content analysis and the policy sciences

In an examination of the evolution of Lasswell's writings on content analysis, Danielson and Lasorsa (1997: p. 104) note that Lasswell and colleagues believed humans lived in a "symbolic environment," an "environment of words and images . . . of meanings that surround us from our earliest moments of existence." Lasswell clearly thought content analysis was a useful method for mapping that symbolic environment as it was manifested in particular cases. For example, his 1927 dissertation applied content analysis to World War I recruitment posters and pamphlets that were dropped from airplanes and balloons. During World War II, he worked to describe and predict Nazi communication activity using content analysis of German newspapers, among other methods, to provide an important window on enemy morale (Neuendorf, 2002). As Naisbitt (1982: p. 3) reported:

The strain on Germany's people, industry, and economy began to show up in its newspapers . . . Over time, it was possible to piece together what was going on in Germany and to figure out whether conditions were improving or deteriorating by carefully tracking local stories about factory openings, closings, and production targets, about train arrivals, departures, and delays and so on.

After the war, Lasswell developed methods including a precursor to computer-assisted coding while heading a program at the Hoover Institute and Library on War at Stanford University, Revolution and the Development of International Relations. He and his colleagues painstakingly transferred codes onto punch cards to run through a counter/sorter machine, all the while working to establish scientific standards for assessing applications of content analytic methodology. According to Danielson and Lasorsa (1997, p. 104):

The methods they used to study the flow of symbols are not unlike those many researchers use today: They sampled text over time. They established the reliability and validity of their coding techniques. They counted the occurrence of key symbols in political documents and in the press. They counted what they called themes (i.e. symbolic condensations of textual units). They applied statistical techniques to describe their findings.

Based on this work, Lasswell is seen as a pioneer who developed “methods of pilot testing, coder training and reliability assessment that served as early models of current sound practice” (Neuendorf, 2002: p. 36).

Lasswell also was interested in using the tools of content analysis to understand and solve policy problems. In at least two papers, Lasswell (1968, 1972) discussed how content analysis could augment studies of the policy process using his policy sciences analytic framework. This framework emphasizes problem-oriented inquiry centered around five intellectual tasks: clarifying goals, describing trends, analyzing conditions, projecting developments and inventing, evaluating and selecting alternatives (see also Brewer and deLeon, 1983; Clark, 2002; Lasswell, 1971). Conducting this sort of inquiry requires an understanding of both the social and decision processes at work. Lasswell’s social process model requires an inventory of the participants, or stakeholders, in the policy process; their perspectives, situations, base values and strategies; and the outcomes and effects of their actions. His decision process model focuses on institutional context: how information is gathered and ideas promoted, what solutions are prescribed, how they are enforced, how resulting disputes are resolved and how the entire process is evaluated and ultimately terminated (Brewer and deLeon, 1983; Clark, 2002; Lasswell, 1971). Clark (2002: p. 9), an expert user of the policy sciences framework as applied to natural resources and environmental policy problems, underscored the importance of Lasswell’s policy sciences analytic framework: “Just as we need maps to locate ourselves spatially in an ecosystem and to carry out management activities, we need realistic maps of the policy process in which we participate.”

Lasswell (1968) thought those maps could be generated by sampling the flow of communication throughout society to disclose policy-significant trends. He proposed dividing the types of communication examined into eight base values categories within his social process model: “Power (e.g. Government, law and politics); Enlightenment (Language, science and communication); Wealth (Agriculture, industry and finance); Well-being (Safety, health and comfort); Skill (Education, arts, vocations); Affection (Family, fraternities); Respect (Classes, castes); and Rectitude (Religion, ethics)” (Lasswell, 1968: p. 60). Lasswell (1968: p. 62) also presented as a “model of communication” the seven category social process model of the policy sciences analytic framework discussed above – participants, perspectives, situations, base values, strategies and outcomes (Clark, 2002). Lasswell (1968: p. 62) related these categories to content analysis, observing that the seven elements together posed the question: “who, with what intentions, in what situations, with what assets, using what strategies, reaches what audiences, with what result?” This focus on communication as a process is one of Lasswell’s most enduring contributions to the communication field, as well as a powerful methodological emphasis for policy analysts.

Four years later, Lasswell (1972: p. 307) challenged communication researchers to take a more active role in society as “a third, disinterested voice to supply a competing appraisal of the images spread by self-serving sources.” He urged them to “report on the adequacy of flows of information that enter into policymaking, as well as on the functioning of the policy process at all stages” (1972: p. 301). He also demonstrated how each of the decision process functions are open to study and assessment using standards attached to each by the policy sciences framework. For example, researchers could appraise the intelligence gathering function for its “dependability, comprehensiveness, selectivity, creativity and openness” (Lasswell, 1972: p. 308). He offered this approach as a way for communication researchers to “take some of our destiny in hand” and chided them with this closing remark: “I therefore pose the question: Do you think that you will get on with it?” (Lasswell, 1972: p. 310).

### Structure and uses of content analysis

To provide context for the methodology described in this paper, we now take a broader look at the use of content analysis today and the many forms it takes. Communications researchers, social scientists, psychologists, and commercial analysts study a wide array of messages – ranging from news accounts (e.g. Bengston et al., 1999; Jordan and Page, 1992; Zehr, 2000) to academic and popular journals (e.g. Henslin and Roesti, 1976; Malone and Orthner, 1988) and transcripts of hearings and interviews (e.g. Taber, 1992; Korsmo, 1990) to movies (e.g. Stern, 2005), advertising billboards (e.g. Mastro and Atkin, 2002) and Web sites (e.g. Musso et al., 2000). In addition, the studies explore a variety of dimensions of communication ranging from the structure of the message alone to characteristics of its source and the impact of the message on its receivers.

Today, many studies, whether funded by government agencies or by the private sector, examine message content to inform policy making and governance. In the 1970s, the U.S. Bureau of Alcohol, Tobacco and Firearms and the Department of Health, Education and Welfare funded separate content analysis studies in Michigan as part of efforts to gauge the effects of alcohol advertising and children’s television programs respectively (Neuendorf, 2002). Taber (1992), a political scientist, conducted a content analysis of Congressional Record documents to build a model to anticipate decisions of policymakers to specific events, including an invasion of South Korea by North Korea. Huebner and colleagues (1997) conducted a study of news articles written over a year’s time to gauge the impact of media coverage on public opinion surrounding President Clinton’s universal health insurance proposal. In a study supported by the U.S. Department of Agriculture’s Forest Service, Bengston et al. (1999) analyzed online news articles about U.S. national forests to measure changes in public opinion about the recreational, commodity, ecological and aesthetic values of forests. Musso and colleagues (Musso et al., 2000) analyzed 270 municipal Web sites in California against a theoretical framework for management and government designed to evaluate the performance of local governments. These are but a few examples of how the method of content analysis can be used for policy-relevant research. Lasswell understood the potential of content analysis to better understand the policy process, specifically, using his policy sciences analytic framework.

Neuendorf (2002) offers a useful integrative model of content analysis that enables us to classify content analysis studies according to whether they focus on one or more of the following qualities: the source of the message; the message and channel it follows; and the receiver of the message. One limitation of content analysis is that it can only

“describe message characteristics or identify relationships among message characteristics. . .” (Neuendorf, 2002: p. 53). Content analysis cannot substitute for other methods, such as polls, surveys, and interviews used to understand communication. But in combination with one or more of these other methods, content analysis methodology can help researchers study relationships between messages, senders, and receivers. Neuendorf (2002: p. 66) cites the work of Gottschalk et al. as an example of studying message senders. Gottschalk and Fronczek analyzed the content of subjects’ reports of dreams and then combined this data with physiological measures of the subjects taken at three different levels of consciousness to reach conclusions about their “cerebral representations of hopefulness and hopelessness” (Gottschalk et al., 1993: p. 14).

In the field of mass communications, agenda setting research often combines news media content analysis (the message) with survey data to draw conclusions about the effects of news coverage on public opinion (the receiver) (e.g. Wanta et al., 2004). An ambitious study by Trumbo (1995) outlines a method to map synergistic effects between the media, public opinion, and policymaking – wherein each plays a role as source and receiver. Simpler, but no less informative, are some studies that examine message content alone without linking data to source or receiver. Dixon and Linz (2002) do this in an analysis of news coverage of pretrial publicity of criminal defendants in Los Angeles that focused on the relationship between reported race of the defendants and the amount of prejudicial information – as defined by the American Bar Association – contained in newscasts. They found that blacks and Latinos were twice as likely to be associated with prejudicial statements.

#### News articles as data

Of all the sources of messages available for analysis, Lasswell and his colleagues working at the Hoover Institute put a premium on newspaper reports, which they found “accessible and rich in the vocabulary of political ideology current among the elite at any given time” (Lasswell et al., 1952: p. 17). Studies show that the news media reflect and also influence both public opinion and policy making. Bengston et al. (1999: p. 187) report: “Analysis of the content of news media has repeatedly been shown to produce results that are remarkably similar to attitude surveys and opinion polls.” Conversely, research on agenda setting theory shows that mass media “not only highlight important issues to consider but also provide interpretive frameworks that influence individuals to think about issues in certain ways but not others” (Huebner et al., 1997: p. 254). Further, Jordan and Page (1992: p. 227) report that analyses “have indicated that U.S. foreign policy corresponds with what a majority of Americans favor, and that “changes in collective public opinion are followed by congruent changes in policy about two thirds of the time.” Such findings are summed up well by Nelkin (1995: p. 72), who writes: “It is the media that creates the reality and sets the public agenda, directly influencing policy decisions.”

International news media, according to Schrondt (2001), resemble “professional intelligence services in both function and structure.” Schrondt concurs with Whaley (Whaley, 1973 cited in Schrondt, 2001) who wrote of news services: “They ferret out, collect, collate, evaluate, analyze, summarize and report vast quantities of information, and they do so with an organization comprising correspondents in the field with their local networks and stringers.” Given the comprehensive nature of news accounts, a sizable sample of articles can yield much information about a policy issue. We turn now to our method, illustrating it at all stages with our study of news coverage about the stratospheric ozone problem.

## A new category system for mapping the rhetorical landscape

### Finding articles to code

The news media was and continues to be integral to the Montreal Protocol policy process. Wrote Benedick (1998: p. 28), a principal architect and chief U.S. negotiator of the protocol:

The U.S. media played an important role in keeping the issue before the American public through press and television coverage of the scientific theories and warnings over use of CFCs. After the diplomatic negotiations began in 1986, media attention intensified; the ozone threat was featured in such widely circulated magazines as *Time* and *Sports Illustrated*.

We selected articles from three news sources for our study: The AP, UPI, and The New York Times. The AP and UPI are international news wire services and the New York Times is a daily newspaper distributed internationally in print and worldwide on the Internet. We chose these organizations because of their ability to reach millions of readers in the United States and around the world; the accessibility of their articles via archives on the Internet; and their consistent and relatively high ethical standards (The Associated Press 2003; United Press International 2002; The New York Times 2003).

We accessed news articles from the Lexis-Nexis database, requesting stories from The AP, UPI, and New York Times written between 1980 and 1987 – the eight years leading up to the enactment of the Montreal Protocol – that contained in their body the terms “stratospheric ozone” or “ozone hole” or “Montreal Protocol.” To avoid duplicates of the same wire service articles, we selected only AM (morning) and BC (both news cycle) stories. BC stories are essentially identical stories that run in both the morning and evening news cycles. This process yielded 90 articles for us to code, with the bulk of stories written in 1986 and 1987.

Unlike the Bengston and Huebner methods, which rely on computer programs to identify and code phrases, our method used the judgment of human coders. Scholars on argumentation and persuasion (Bitzer, 1959; Woodward and Denton, 2000) have long contended that important elements of arguments are often implied rather than explicit in statements made within a text. We believe human coders are more alert to those implied elements as they read arguments in their context. Thus, whatever our method lacks in relative speed of analysis and quantity of articles analyzed, it makes up in quality of analysis. In some cases, text is best analyzed by humans because, as Stone put it, “somewhere embedded in the analysis is a very human judgment” (Stone, 1997: p. 47).

Our coding scheme can be accomplished on pencil and paper but we use a qualitative analysis program (Atlas.ti, 2003) that allows us to load our articles in text format onto a computer screen, electronically highlight passages, and assign our codes to them. We can easily search and sort our results using an electronic search function. Separately, we record the presence or absence of codes using ones and zeros in a computer spreadsheet program which enables us to make graphic charts of our findings.

Researchers code the articles by following four steps: (1) identify statements to be coded; (2) assign each statement one or more of 16 codes to establish the direction and substance of the argument relative to the proposed policy (these codes can only count once per article); (3) assign each statement one or more of five policy issue criteria codes; (4) note the source/subject of each statement and assign it a corresponding code (i.e. a statement by a scientist would be coded “scientist”).



## Identifying arguments in articles

Researchers seek out statements in news articles that bear upon (1) the destruction of stratospheric ozone by manmade chemicals called chlorofluorocarbons (CFCs) and/or (2) proposals to solve the problem of stratospheric ozone depletion. Statements qualify for coding if they comprise both a claim and data. These elements of argument, drawn from Toulmin's theory of argument (Toulmin, 1958; Toulmin et al., 1979), constitute the "main proof line" (Brockriede and Ehninger, 1960), which Hauser (1986: p. 178) succinctly explains as follows: "Data answers the question, 'What have you got to go on?' . . . Claim is the inference drawn as a conclusion from the data. It is where we are going with the argument." Consider the elements of two example arguments, which we will refer to as we describe our coding steps. Note first that both arguments are relevant to either our policy problem or the proposed solution.

Claim: "Dr. Joseph M. Steed, a DuPont scientist, said, 'discussion of the possible effect on ozone from chlorofluorocarbons alone is unrealistic and does not reflect real world conditions.'" Data: "He said new computer calculations made at the Lawrence Livermore National Laboratory suggest there will be no change in the ozone layer over the next century when the combined effect of several chemicals are considered" (Connell, 1982).

In this case, the underlined claim is supported by "new computer calculations." Those calculations are what Steed, in the words of Hauser, has "to go on."

Claim: "Ms. Ehrsam said McDonald's products would continue to be sold in foam packages, but they will be manufactured with hydrocarbon-based blowing agents." Data: "She said these agents are considered environmentally safe by federal authorities. 'We don't anticipate any added costs to our customers, she said in a telephone interview'" (Goeller, 1987a).

Here the claim that McDonald's will continue using foam packages is supported by two forms of data: the contention that the new foam packages are environmentally safe and that using them will likely not cost more. Often claims and data are lumped closely together, but sometimes they are in separate parts of the story. Transition words like "because," "thus," and "therefore" are good indicators of data and claims but they are not always present, as with the first example above. Sometimes several claims made in one article rely on the same statement or statements of data. Here again we see the necessity of human evaluation to detect connections between claims and data.

## Coding the direction and substance of arguments

Before we can code an argument about stratospheric ozone depletion for its relevance to the Montreal Protocol, we must more narrowly define what we mean by the Montreal Protocol. This is necessary to ensure focus and consistency. Thus, for coding purposes, we define the Montreal Protocol by its most basic goals and principles, which we distilled from the original 1987 document. The goals are to freeze CFC emissions in 1989 at 1986 levels; reduce emissions by 20 percent in 1993; and by another 30 percent by 1998. The principles comprise the 244-word preamble to the original protocol (UNEP 1987 reprinted in Benedick: p. 353).

Having identified an argument, coders then proceed to code it for both rhetorical substance and direction relative to the goals and principles of the Montreal Protocol. Direction refers to whether the argument is opposed or in support of the protocol. For example, an article



might contain several arguments against cutting back the production of chlorofluorocarbons (CFCs) to halt the worldwide destruction of stratospheric ozone. If the proposed policy being studied is the Montreal Protocol, which calls for just that, then these statements would be coded as arguments “Against” the proposed policy that are international or transboundary. Substance refers to two sets of criteria: First, whether the argument is economic, political, social, or environmental (we use the more inclusive but slightly less intuitive term “natural”); and second, whether it is international or domestic in scope. For example, if opposition to the protocol is based on, say, the exorbitant cost to transnational corporations, the substance of the argument would be coded “Economic,” rather than “Social” or “Political.” It would also be coded “Transboundary,” rather than “Local.” An argument that is determined to be “For” the Montreal Protocol and is “Social” and “Transboundary” gets the code “FST.”

In all, this approach yields 16 potential code combinations for direction and substance. Eight are “For”: FEL, FET, FPL, FPT, FSL, FST, FNL, FNT. And eight are “Against”: AEL, AET, APL, APT, ASL, AST, ANL, ANT. We provide some examples below. Let’s code our first sample argument from the DuPont scientist. Because the Montreal Protocol aims to correct the problem of stratospheric ozone depletion by eliminating CFCs, we can conclude by reviewing our criteria and the goals and principles of the protocol that this statement is “Against” the protocol. The data are grounded in scientific research on the environment and so we code the argument “Natural.” Finally, the argument is concerned with a transboundary phenomenon – the destruction of ozone – and so we code it “Transboundary.” The result is the three-letter code: ANT.

Now to the second argument, which qualifies for more than one code. McDonald’s has announced that it is giving up on packaging containing CFCs and switching to products that do no harm the ozone layer. This is clearly in line with the goals and principles of the Montreal Protocol and so we code it “For.” The data, again, are concerned with environmental quality and so we code it “Natural.” However, a case could be made that this argument is also “Economic” because the data indicates that environmentally safe substitutes are commercially available. Is it Transboundary or Local? On this, the two codes split. Environmentally, it’s a transboundary issue, because CFCs know no borders. Economically, it’s a local issue, because elsewhere in the article the McDonald’s spokesperson said the packaging changes would take place first only in the United States. So we code this argument both FNT and FEL.

#### Coding arguments for relevance to policy issue criteria

In the next step, the coders determine which of five criteria of effective policy making are put at issue by the arguments. These criteria include (1) the establishment of an accurate definition of the problem, (2) the proposition of a policy solution appropriate to the defined problem, (3) the acquisition of necessary support for the policy, (4) the technical feasibility of the proposed policy and (5) the establishment of accountability for carrying out the solution. It is possible for an argument to be relevant to just one or several of these categories at once. We call these criteria of “effective” policymaking because we believe each must be addressed and adjudicated during public policy formation (Lasswell, 1971; Brewer and deLeon, 1983). For example, news articles might contain statements contesting the theory that CFCs destroy ozone. This relates to the issue of whether the policy is based on an appropriate definition of the problem. Another statement might refer to the logistical difficulties of pulling off such a ban, which would clearly relate to the issue of feasibility. In sum, these five criteria enable us to envision the overall range of possible issues a proposed policy faces and get a sense of that policy’s potential to resolve these issues. Our sample DuPont argument is primarily relevant

to the first of the five criteria: Does the argument relate to whether the policy problem is defined appropriately? Our McDonald's argument was coded twice. The first code, FNT, is relevant to several of the criteria: the definition of the problem, support for the policy, and the feasibility of the policy. The second code, FEL, is relevant to support for the policy and the policy's feasibility.

### Identifying stakeholder groups

The final step in the coding process records the stakeholders (i.e. scientists, environmentalists, the public, and industry officials) that are explicitly linked to coded arguments. By explicitly linked we mean that the stakeholder is either the clearly identified source of an argument or a clear topic of the argument. For example, an argument by an environmentalist deriding industry's position on CFCs would be coded both "environmentalist" and "industry." Codes to identify stakeholder groups should be created only after completing the task of coding all arguments in the sample for direction, substance, and policy issue criteria. After examining the claims in this study, we created seven categories for stakeholders that appeared most often in the arguments: "scientists," "U.S. government," "industry," "environmentalists," "United Nations," and "Europe." This is a somewhat subjective process that depends not only on the content of the sample's arguments but the level of detail the researcher wishes to consider. Once the codes are defined, assigning them is relatively straightforward. Arguments that do not have explicitly named stakeholders are left without a stakeholder code. Allowing that stakeholders can wear more than one hat, a single source in an argument can be assigned more than one code. For example, our example statement by the DuPont scientist was coded "industry" and "scientist." Many arguments contain multiple stakeholders. The example below was coded "U.S. government," "industry," and "scientists."

NASA, which will provide most of the money, will be joined in the effort by at least three other Federal science agencies; the Chemical Manufacturers Association; scientists from Harvard University, the University of Denver, and the University of Washington, and the governments of Argentina, Chile, France, New Zealand and Britain (NASA team plans to investigate ozone hole above the Antarctic 1987).

### Intercoder reliability

The true value of our descriptive policy model lies in its potential to be effectively replicated and used by others. In their article on assessing and reporting intercoder reliability in mass communication content analysis, Lombard et al. (2002: p. 589) define intercoder reliability as "the extent to which independent coders evaluate a characteristic of a message or artifact and reach the same conclusion." They note that when intercoder reliability is not established, the data and its interpretations of the data "can never be considered valid" (2002: p. 589). As noted earlier, in this study, we subscribe to a definition of validity that Schwandt (1997) calls "fallibilistic validity": "Here validity is understood as a test of whether an account accurately represents the social phenomena to which it refers. Yet no claim is made that . . . a valid account is absolutely certain. Defenders of this view hold that one can have good reasons for accepting an account as true or false, yet an account is always fallible" (Schwandt, 1997: p. 169).

We tested our method by having two senior undergraduate students and an author/researcher independently code a subset of our sample (49 of the 90 articles) after undergoing five hours of training – which included coding five separate articles each – to familiarize themselves with the method and calibrate their judgment. After coding the five test articles,

the team discussed the results and compiled some additional guidelines to help handle “tough calls” specific to their subject matter. The coding results discussed in this paper are those conducted by the researcher alone on the 90 article sample.

Lombard and colleagues (2002: p. 588) note that “there are few standards or guidelines available concerning how to properly calculate and report intercoder reliability” and few established standards for what constitutes acceptable intercoder reliability. To measure intercoder reliability, we chose both the commonly used percent agreement and the more rigorous Cohen’s kappa test. For both measures, .00 = no agreement and 1.00 = perfect agreement. Percent agreement “is the percentage of all coding decisions made by pairs of coders on which the coders agree” (Lombard et al., 2002: p. 590). A kappa score is “a measure of agreement between two observers taking into account agreement that could occur by chance (expected agreement)” (Kappa, 2000). Because of this, kappa scores, which are more conservative, are consistently lower than percent agreement scores. Given Lombard’s definition of intercoder reliability, cited earlier, we can conclude that high scores indicate coders understand the coding categories in a similar way and apply them to get similar results.

There are few hard and fast rules for what constitutes an acceptable level of reliability. For percent agreement, we concur with “rules of thumb” from several methodologists compiled by Neuendorf (2002: p. 143) who writes that “coefficients of .90 or greater would be acceptable to all, .80 acceptable in most situations, and below that there exists great disagreement.” She notes that more liberal criteria are used for more conservative measures, including kappa. We chose the following criteria by Landis and Koch (1977: p. 165) for interpreting the results of kappa tests: Poor = .0–.19; Fair = .2–.39; Moderate = .4–.59; Substantial = .6–.79; Almost Perfect .8–1. In Table 2 we report the percent and kappa scores for the level of agreement between our student coders and between the researcher and each student respectively for two categories of rhetorical direction; six categories of rhetorical substance; the aggregate direction and substance; and the aggregate policy issue criteria.

We did not test intercoder reliability for identifying stakeholders groups because it is found in explicit content and requires little, if any, judgment. Note that the scores for direction and substance codes are based on a more thorough test of all of their possible combinations, as opposed to a more basic test of their individual presence or absence in the 49 articles. For example, the kappa and percent score for the code “For” collectively tests results for: FEL, FET, FPL, FPT, FSL, FST, FNL and FNT. Thus, the sample size is 392; that is eight possible combinations multiplied by 49 news articles. Likewise, scores for Economic codes are based on a test of all four possible combinations: FEL, FET, AEL and AET. The sample size here is 196; four possible code combinations multiplied by 49.

On the aggregate or overall direction and substance of arguments, the kappa test revealed a “substantial” level of agreement among all three coders. By our criteria, percent agreements were well within the “acceptable” range. Agreement among coders on the overall set of policy issue criteria was in the “moderate” range. Neuendorf lists four broad factors that can threaten reliability: a poorly executed coding scheme, inadequate coder training, coder fatigue and the presence of a rogue coder. We took care to avoid all of these by practicing, limiting our coding time to 90 min with breaks, and familiarizing ourselves with our own environmental biases.

Fair to moderate kappa scores and percent agreement in the low 80s reveal a need for improvement in the Political category. In the Economic and Local categories, we also netted only fair to moderate kappa scores but very high percent scores. This split is an artifact of the relative dearth of Economic and Local arguments in our data set and the kappa statistic formula itself. Kappa requires not only a demonstration that coders can agree when something is not present in the data but that they also can agree when it is. In our case, the coders agreed

**Table 2** Summary of intercoder reliability results

	Category	Coder 1/Coder 2		Control/Coder 1		Control/Coder 2	
		Kappa	%	Kappa	%	Kappa	%
Direction	Across eight variations of each code ( $N = 392$ )	0.66	0.85	0.65	0.84	0.73	0.88
	Against	0.45	0.94	0.39	0.91	0.34	0.92
Substance	Across four variations of each code ( $N = 196$ )	0.37	0.90	0.43	0.90	0.46	0.92
	Economic						
	Political	0.38	0.80	0.47	0.80	0.58	0.83
	Social	0.79	0.93	0.65	0.90	0.66	0.90
	Natural	0.86	0.94	0.79	0.91	0.85	0.94
Direction & substance	Across eight variations of each code ( $N = 392$ )	0.11	0.92	0.34	0.93	0.33	0.93
	Transboundary	0.71	0.87	0.62	0.83	0.71	0.87
	Above eight categories ( $N = 784$ )	0.66	0.89	0.62	0.88	0.68	0.90
Policy issue criteria	Combined five policy issue categories ( $N = 245$ )	0.56	0.78	0.55	0.78	0.55	0.77

overwhelmingly that Economic and Local arguments were absent from many articles in our data set. Because the sample of possible matches for present Economic and Local arguments was quite small, any mismatches in detecting the presence of these arguments carried a greater weight given how the kappa statistic is computed. The remedy for this could be more training on a data set richer in these types of arguments. However, to the extent news coverage is focused away from one or more of our substance categories and heavily on something else – as reports on specific topics are likely to do – this effect may again appear in our kappa scores. The more coders train and the wider variety of arguments they encounter, the more likely they will agree.

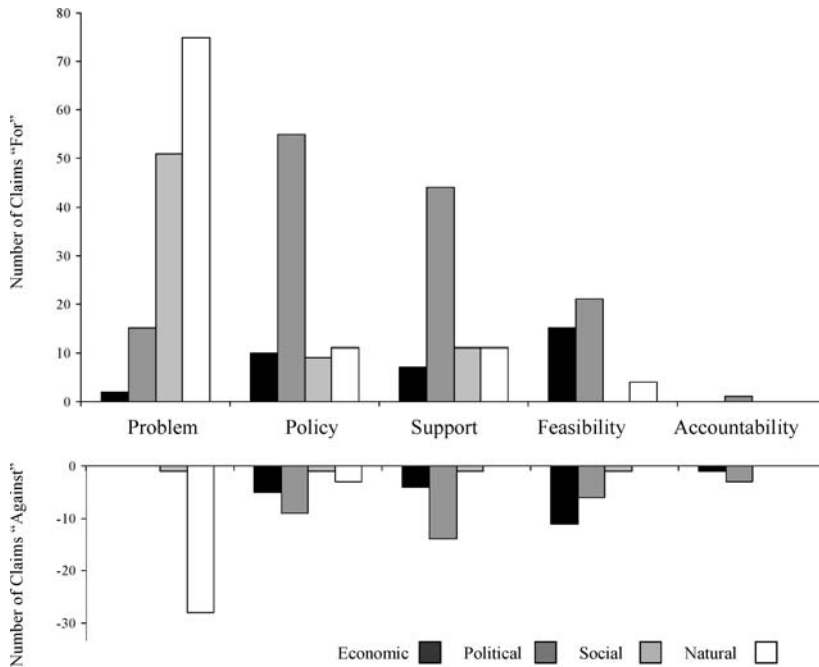
#### Coder orientation

Though the coders follow the same instructions, they are also making subjective judgment calls which could be influenced by personal beliefs about the environment and how humans interact with it. Dryzek notes that everyone subscribes to one or more environmental discourses. Because coders' varied environmental discourses have the potential to skew our intercoder reliability results, we had the students and researcher rate their agreement or disagreement – on a scale of 1–10 – with summaries of Dryzek's nine environmental discourses (Dryzek, 1997).

For the purposes of our analyses in this paper, we identify our two student coders as "Coder 1" and "Coder 2," and the researcher as "Control." To assess the similarity between the raters' endorsement of Dryzek's nine discourses, a Pearson  $r$  (SPSS, 2003) was performed on the nine scores for each pair of coders with the following results: Coder 1/Coder 2 = .602; Control/Coder 1 = .878; and Control/Coder 2 = .831. Overall, there is pretty high consistency among all three coders in preference levels for the nine discourses. We conclude from this that it would be hard to link any differences in news article coding outcomes to different environmental discourse preferences.

#### Policy-relevant "maps" of news reportage about the Montreal Protocol

Our categorical system yielded useful maps of the rhetorical landscape of the Montreal Protocol as manifested in news reporting. Here are the leading features of these maps. Are the arguments supportive or opposed to the goals and/or principles of the policy? In all, we identified and coded 294 arguments. Of those, the vast majority (79 percent or 231 arguments) were "For" the Montreal Protocol's goals and principles. The remaining 21 percent (63 arguments) were coded "Against." In what proportion are the arguments international or domestic, and economic, political, social, or environmental in nature? We found that scientific and environmental (natural) arguments supporting the protocol's goals and principles predominated, followed closely by political and social arguments. Results were as follows: "Natural" (39 percent, 114 arguments), followed by "Political" (31 percent, 91 arguments), "Social" (19 percent, 56 arguments) and then "Economic" (11 percent, 33 arguments). International arguments outnumbered domestic arguments more than five-to-one and largely focused on the environmental consequences of the policy problem. "Transboundary" arguments (84 percent, or 247 arguments) predominated, as opposed to "Local" arguments (16 percent, 47 arguments). This was not surprising because our study examines a transboundary environmental problem. What stakeholder groups are main sources/subjects of the arguments? The analysis identified principal stakeholder groups in our sample listed here in order of their relative prevalence as a percent of total arguments to which they are linked: scientists and researchers (35 percent, 113 arguments), U.S. Government officials and agencies (29



**Fig. 1** Policy issue criteria by direction and substance of arguments in news reports on the ozone hole 1980–1987

percent, 92 arguments), industry officials (10 percent, 32 claims), European officials (9 percent, 29 claims), the public in general (7 percent, 22 claims), the United Nations (7 percent, 22 claims), and environmentalists (3 percent, 10 claims). We also identified relationships between arguments and policy-related issues: definition of the problem; appropriate solutions; political support; technical feasibility; and accountability for implementation. Recall that more than one policy issue criteria code can be assigned to a single argument. Thus the percentages for the five categories of the whole sample (294 arguments) do not add up to 100. The percentage distributions follow: problem (59 percent, 172 claims), policy (35 percent, 103 claims), support (31 percent, 92 claims), feasibility (20 percent, 58 claims), and accountability (2 percent, 5 claims).

When examining these results it is useful to look at the distribution of substance codes (Economic, Political, Social and Natural) across each policy issue category to understand which kinds of arguments are more relevant to each respective policy issue criteria. Figure 1 shows the raw number of arguments between 1980 and 1987 that fell into each of our five policy issue criteria categories by direction and substance.

We can ask, for example, if a discussion about the policy problem is mostly about economics or about natural science. We find that it is mostly about natural science. It is also useful, in some instances, to know what percent of a given substance category comprises the data assigned to a particular criterion. For example, a stack of economic arguments in the feasibility category might seem relatively small at first glance, but it represents the largest concentration of economic arguments among the five policy issue categories. We can claim that economic arguments are more closely tied to feasibility than any of the other issue criteria. Let's examine what the data tell us about each of the five policy issue criteria.

A majority of the arguments in the news reports were focused on the policy problem itself. Within that category arguments were predominantly about the natural environment (60 percent of 172 arguments) and cancer risks to society (30 percent of 172). When we examine the number of Natural and Social claims in the problem category as a percentage of the total number of each in our data the percentages jump to 90 and 93 respectively. In other words, more than nine out of 10 claims in both the Natural and Social categories have relevance to the policy problem. In contrast, Political arguments predominated on the policy issue (62 percent of a total 103 claims), followed by Economic and Natural arguments (15 and 14 percent, respectively of 103). Political arguments predominated on the support issue (63 percent of 92 claims), followed distantly by Economic and Natural arguments. Economic and Political arguments virtually tied on the issue of feasibility (45 percent and 47 percent respectively of 58 claims). The importance of Economic arguments to feasibility issues becomes clear when we consider that 26 of 33 Economic arguments in the entire data set are linked to feasibility. Put another way, more than three out of four Economic claims were relevant to feasibility. We found very few arguments (5 claims) related to accountability issues. The near absence of arguments related to that issue might be explained by the fact that the policy was new and that implementation monitoring and enforcement had not been initiated during the period of the study. It might also reflect a relative lack of interest in these matters on the part of the news media.

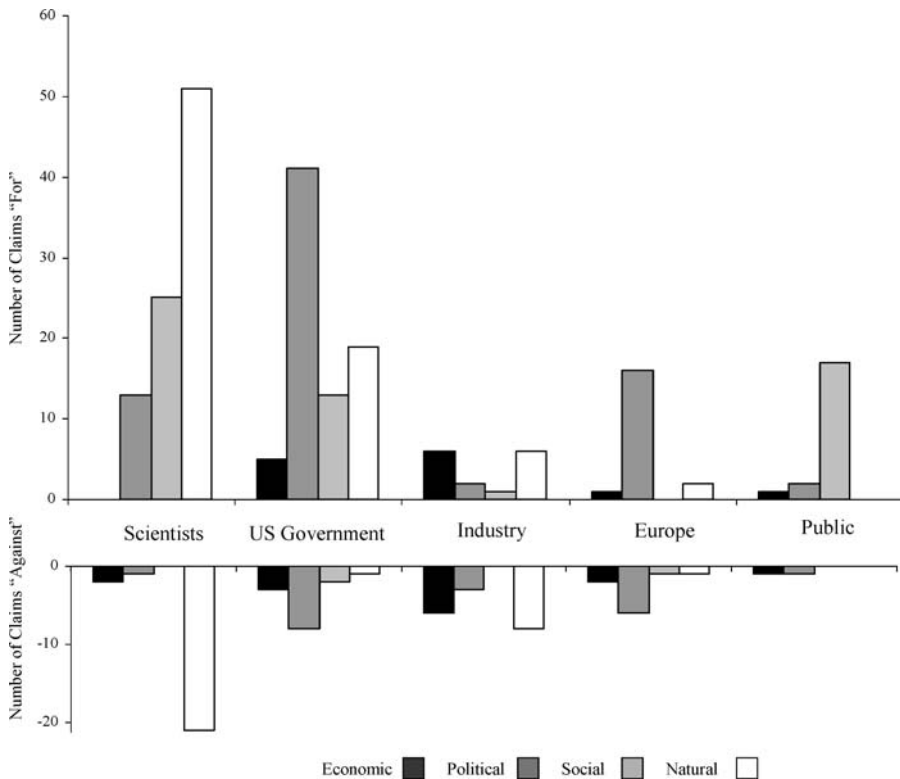
## Discussion

We contend that our methodology for mapping the rhetorical landscape of policy-relevant news reportage (1) has utility for users of the policy sciences analytic framework, (2) improves upon other category systems and (3) raises important methodological issues. We shall discuss these in turn.

### Utility for users of the policy sciences framework

The data appearing on our rhetorical landscape map can be used to chart an understanding of the social and decision processes surrounding the Montreal Protocol. Our system can inform understanding of at least five of the seven elements of the social process as defined by Lasswell and colleagues: (1) Participants: these are the people and organizations with a stake in the policy; (2) Perspectives: the varied viewpoints of these stakeholders; (3) Situations: the situations in which the stakeholders interact; (4) Base Values: assets used by stakeholders to pursue their goals (power, wealth, enlightenment, skill, well-being, affection, respect and rectitude); (5) Strategies: the approaches stakeholders use to achieve their goals (Clark, 2002: pp. 33–34). We do not list the sixth and seventh elements of the social process – the short-term “outcomes” and long-term “effects” – because our study is limited to news accounts written during the run-up to the actual adoption of the Montreal Protocol and the months just after its approval. We chose this time frame because we wanted to observe the social process during the policy’s development. Our data therefore has little to say about outcomes and nothing to say about long-term changes. For the same reason, the demonstration of our method in this article is limited to the first two of the seven decision process elements: (1) Intelligence gathering: how information is obtained to make decisions, and (2) Promotion: defined by Clark as “recommending and mobilizing support for policy alternatives” (Clark, 2002: p. 61). As the policy itself progresses, we can expect news reports to say more about the





**Fig. 2** Stakeholders' arguments by direction and substance in news reports on the ozone hole 1980–1987

remaining five decision process categories: prescription, invocation, application, appraisal, and termination.

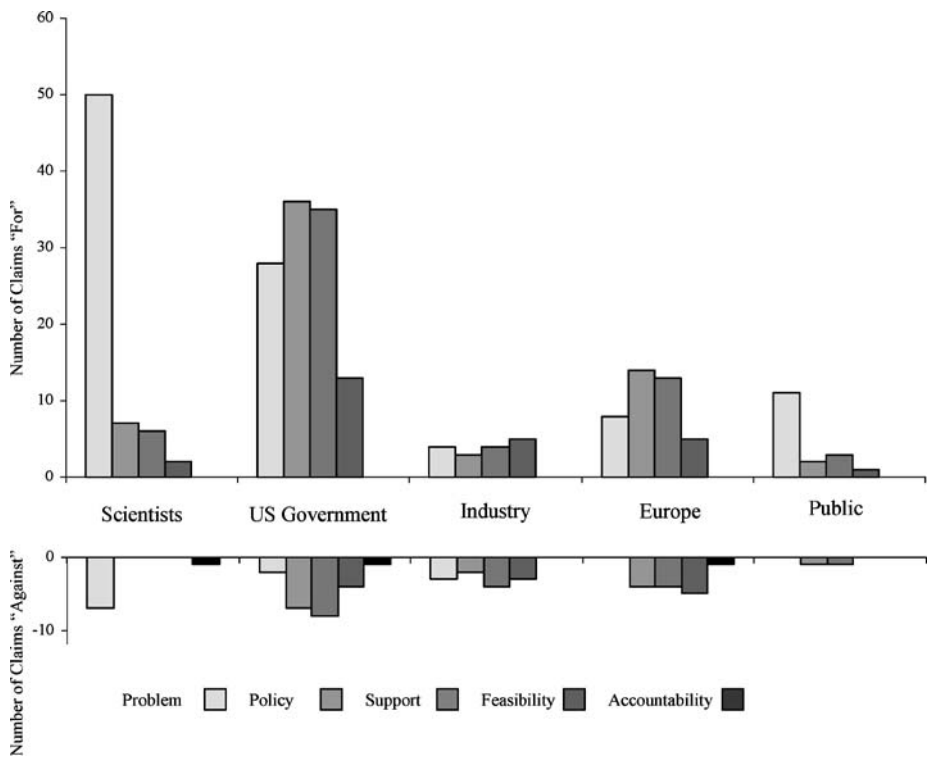
To demonstrate the utility of our data for informing the social and decision processes, we will focus primarily on the largest group of participants (stakeholders) in our sample – scientists. Scientists took the lion's share of the media spotlight, appearing in 113 arguments, or 35 percent of the total. A quick review of these arguments shows that scientists represented a wide array of institutions, including universities in the United States and abroad, U.S. government agencies such as NASA and NOAA, and associations such as the National Science Foundation and the United Nations' World Meteorological Organization. A minority of scientists quoted in news reports worked for the chemical industry. Figure 2 gives data about the perspectives of our five biggest stakeholder groups over the entire sample period – from 1980 to 1987 – by tallying the direction and substance of the arguments to which they are linked.

We can see immediately that the scientist profile in Figure 2 is a very close match in structure and size to the "problem" profile in Figure 1. Scientists' arguments were overwhelmingly, and understandably, grounded in research on the environment. By more than a two-to-one margin, their arguments supported the protocol's aims, whether manifested as direct quotes or as boilerplate background statements. This tells us much about the intelligence gathering function in the decision process. The following argument was typical:

Scientists have strongly suspected for a decade that chlorine, and particularly the chlorofluorocarbons used in refrigeration, aerosols and other commercial applications, destroys ozone molecules and thus depletes the stratospheric blanket that filters out most ultraviolet radiation from the sun (Freudenheim et al., 1986).

Scientists' arguments coded "Against" the protocol typically presented alternative theories to ozone destruction or urged a wait-and-see approach, both of which run counter to the protocol's goals of quickly cutting back CFCs. By searching the code combination "scientists" "Against" "Natural" "problem" – we can focus on specific arguments and explore the reasoning behind them. The above search combination gets 22 hits, among them a claim from a Clarkson University professor that wind patterns were to blame for ozone destruction. The data we coded as backing this claim provides useful information: "The observed 40 percent decline in Antarctic column density of ozone between 1979 and 1985 can be caused by a 16 degree Celsius (29 degrees Fahrenheit) cooling in the lower stratosphere. Such a temperature change has in fact occurred," he said" (Darst, 1987).

The data we've examined so far also can tell us a good deal about the situations of our stakeholders disclosed through the arguments. Scientists, for their part, mostly presented research results while politicians debated and promoted policy. Figure 3 shows that government officials were linked in far greater proportion than scientists to arguments relevant to policy and support – codes that collectively provide a gauge of the promotion function in the decision process.



**Fig. 3** Top five stakeholder groups' arguments by direction and policy issue criteria in news reports 1987

Figure 3 also shows some exceptions among scientists. By searching the corresponding code combination – “scientists” “For” “Natural” “policy” – we find that Sherwood Rowland, a pioneer in CFC-ozone research from the University of California-Irvine, urged U.S. senators at a hearing a month after the Montreal Protocol’s approval to do more: “We need to act now and impose severe restrictions on CFC emissions immediately if we want to bring the chlorine concentrations in the atmosphere under control by early in the next century” (Goeller, 1987b). Our methodology enables us to focus in on Rowland’s remarks, while our results tell us that among his peers his stance was the exception and not the rule – a rare example of policy promotion among scientists quoted in the news media.

While reviewing arguments, we can often discern the context or situation in which our stakeholders interacted. Scientists’ efforts and opinions were a constant staple of news coverage. They often were cited in the release of new research findings or at the launching of research studies. Scientists also spoke at Congressional hearings and in interviews from research stations. As a whole, they were portrayed as busy, systematic, pursuers of data using high-flying airplanes, satellites, and computers in an effort to save the planet. We also find that some research scientists find themselves in a competitive situation. “People always disagree with the competition,” chemist Igor Eberstein told The AP in a story entitled “Theory Blames Ozone Loss on Snowballs from Space.” Said Eberstein, who devised the theory with colleague physicist Maurice Dubin, “Like many new theories, it generates hostility from people who have established views” (Siegel, 1987).

Examining the context of claims also provides insight into the base values of our stakeholder groups. Our data show that scientists command the bulk of news media attention regarding the stratospheric ozone problem, and that is an important form of power – the power to make one’s message heard. Because of scientists’ enlightenment about atmospheric chemistry and their skill at researching the problem of ozone destruction, they had the ear of policy making bodies, including Congress, which financed much of their research. Their wealth is in the form of government grants to pay salaries, launch and operate satellites, and sustain expeditions at the South Pole. Rectitude is apparent among scientists to the extent their comments reflect the ethics of their profession – such as not rushing to conclusions on limited data. Rowland, for his part, broke with convention by recommending a policy of “severe” cutbacks in CFCs. This was motivated by his concern for public well-being. While doubtless important to scientists, little is mentioned in our problem context about the remaining base values of respect and affection. The strategies element of the social process is difficult to illuminate with our data, but we can see political maneuvers used to capture the media’s attention. Several stories in our sample focused on a controversial suggestion by Interior Secretary Donald P. Hodel that the U.S. government consider promoting use of hats and sunglasses as an alternative to an ozone treaty and the reaction to it: “Environmentalists and members of both parties in Congress denounced the purported plan Friday as irresponsible and absurd” (Darst, 1987).

On the other hand, we could not find (as did Benedick, 1998: p. 5) the close collaboration between politicians and scientists, “who were drawn out of their laboratories and into the negotiation process,” credited with raising the knowledge base about the ozone problem and communicating the need for a solution to the public. Benedick reports that this coordination was central to large media and diplomatic campaigns by the U.S. government and the UNEP for a global ozone treaty, but we found no explicit reference to this coordination. However, our data do show strong support for the protocol among scientists and government officials that certainly comports with Benedick’s observations. Our data reveal elements of the social and decision processes, but also can, to some extent, conceal manifestations of those elements. For example, absent entirely from news accounts are voices of lay citizens. Instead,

they are referred to by scientists and politicians as potential victims in sweeping statements about the public welfare and health of “Americans.” For this, we created the stakeholder category entitled “public.” Our data shows the public was overwhelmingly invoked in arguments favoring the protocol about the “problem” and “Social” danger of skin cancer. Environmentalist-related arguments barely registered in news reports. They were attached to three percent of the claims. The relative absence of these groups says much about who the news media chooses to listen to and who to ignore.

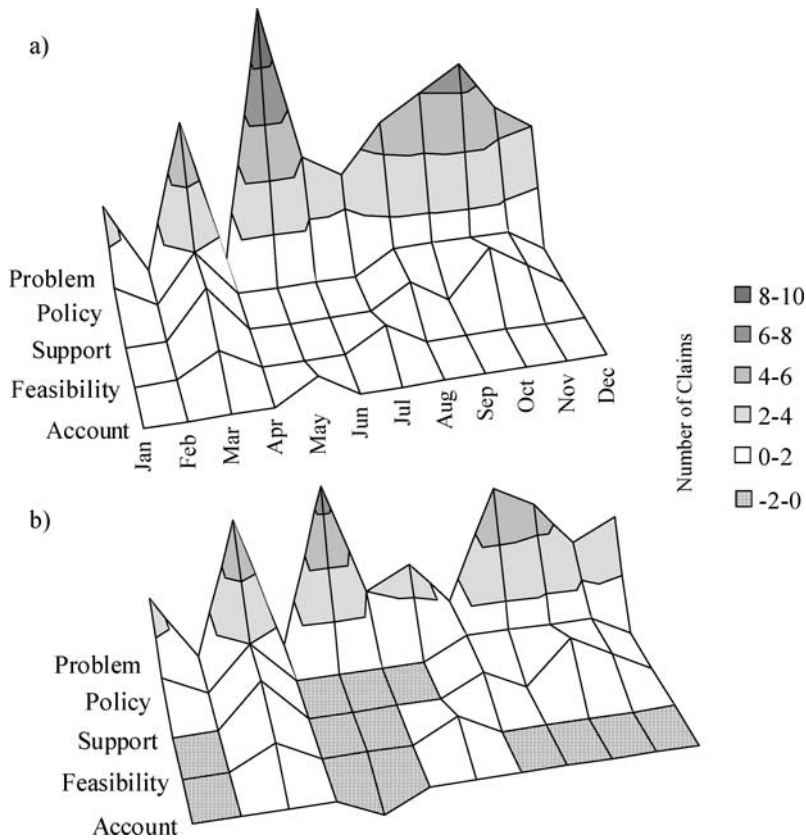
Let’s now consider some of the policy-related trends disclosed in our data. We know that on balance the news reporting is overwhelmingly supportive of the goals and principles of the Montreal Protocol. More than half of all the arguments were about the problem. The problem is defined in the media as CFCs causing the ozone hole, leading to a human skin cancer risk. The bulk of articles (exactly two-thirds) were published in the busy last year of our sample, 1987. Examining the data over time, we see that spikes in news coverage – and by extension, spikes in rhetorical arguments – correspond with big news events such as international policy conferences, reports of scientific expedition results, and political controversies.

A plot of all arguments in 1987 – again, the busiest year of our sample – shows spikes in rhetorical arguments relevant to the protocol in March, May, September, and December. A review of these arguments enables us to assemble a timeline of what happened. In March, American scientists reported results from a large expedition to the South Pole. In May, a convergence of events attracted media attention, among them a UNEP conference in Geneva to negotiate a stratospheric ozone protocol, a Senate hearing on potential ozone regulations, and the fracas over Interior Secretary Hodel’s “hat’s and sunglasses” approach to ozone policy. September was the month of the Montreal Protocol’s adoption. December turned to reporting on U.S. efforts to comply with the protocol. Against this backdrop, we can ask what the evolution of scientists’ public rhetoric looked like in terms of direction and emphasis on the issues of policy formation and prescription.

Figures 4a and 4b show us a map of the evolution of scientists’ rhetoric in 1987. Figure 4a displays the total number of claims by policy issue criteria without direction. Figure 4b displays direction as a differential between “For” and “Against” claims, leaving us with a single landscape where peaks indicate cumulative arguments “For” and valleys indicate cumulative arguments “Against.” Together, these figures confirm that throughout 1987 scientists’ public rhetoric was consistently focused on the problem and strongly in favor of the protocol throughout the events of May, March, and September.

In Figure 4a, an additional peak is visible in October. A look at the coded arguments reveals why we see a dip for that month in Figure 4b: Scientists warned at a Senate hearing that the ozone hole was worsening and that the newly minted Montreal Protocol was not up to the task of fixing it. Reported the *New York Times*: “The atmosphere’s protective ozone layer is so depleted over Antarctica in the springtime that there is cause for concern about the safety of scientists and support personnel there” (Sullivan, 1987). Thus, we can focus in on peaks and valleys to understand what they mean and match them with a timeline. What emerges is a picture of the evolution of a specific participant groups’ role in the social process as captured in news media reports. It can be compared with those of other groups and placed in context with larger trends in the data source. This format for visualizing the data can be useful, especially when comparing arguments across actors and substance categories. For example, in our study, politicians’ arguments in 1987 were heavier and more evenly divided by direction, and had a greater emphasis on policy solutions.

These findings can help a policy practitioner understand who is getting across what message and when, and what structure the messages take relative to a set of policy goals and principles. For example, in our study arguments from scientists skeptical of the theory linking



**Fig. 4** Scientists' arguments in 1987 by policy issue criteria: (a) Arguments in aggregate and (b) by direction expressed as a differential ("For" – "Against" arguments)

CFCs to stratospheric ozone destruction were overwhelmed by those who backed it. We can see when, where and by how much. As noted above, the substance of these competing arguments and their context – how they are justified and where they were presented – yields much information about the intelligence gathering process. The same is true for policy promotion. This is not surprising, we have noted, because our sample is focused on the intelligence gathering and promotion phases of the Montreal protocol process. But policy practitioners can use this data to reassess and make better decisions about their own intelligence gathering and promotion efforts relative to the public debate on specific issues of interest. For example, policymakers opposed to efforts to ban CFCs would see that science debunking the argument that CFCs destroyed ozone was overwhelmed by reports to the contrary, and they would also see that their promotion efforts were also lagging. Environmental groups backing a tough treaty might despair to see themselves quoted so little in the news reports. But they would know from the data that the balance of public rhetoric in the news media is on their side. It might serve as a gauge of their behind-the-scenes efforts to influence the news media and public opinion. The group of collaborating scientists and government officials referred to by Benedick would also see that their public efforts are paying off. Additionally, these interests could see how they are doing relative to one another on a monthly basis and adjust their strategies accordingly.

Separately, analysts could use maps of the rhetorical landscape to test out their own policy goals and guiding principles against recent news coverage. Or they could revisit past policies to conduct a post mortem. For example, a much smaller pilot study of a sample of articles about the Clinton administration's ill-fated BTU (British Thermal Unit) tax proposal found that arguments "Against" the proposal outnumbered those "For" nearly three-to-one, and were centered on concern about the domestic economy (Howland et al., 2001). A closer look at the arguments chosen for coding revealed confusion across Washington about the purpose of the policy itself: Was it a deficit reduction tool or a cure for global warming? For the policy practitioner in the heat of making recommendations, this method could help illuminate such problems before they have a chance to make trouble. It might also help light the way to better strategies for finding and implementing solutions.

### A comparison of category systems

A variety of research approaches have been taken to content analysis ranging from highly qualitative and interpretive studies to quantitative hypothesis tests. There is less-than-universal agreement among researchers about what constitutes "content analysis." Weber (1990: p. 9) writes: "Content analysis is a research method that uses a set of procedures to make valid inferences from text." By contrast, Neuendorf (2002) contends that to qualify for the moniker "content analysis," a content analysis system should meet the standards of the scientific method which include establishing intersubjectivity, an a-priori design, reliability, generalizability, and replicability. Our method meets these standards, but our interest in studying the policy process does not involve hypothesis testing. Rather, we pursue research questions that disclose policy-relevant patterns and trends in our data. To compare our approach with other content analysis methods, we identified studies that examined news coverage of global environmental issues using categorical coding systems similar to our own. Most examined global climate change which has similarities with the stratospheric ozone problem. We contrasted the methods used in these studies with our own according to purpose and structure. While we argue that our category system is best suited for the purpose of informing research studies using the policy sciences analytic framework, we make no claim that it is superior to others given their distinctive, respective purposes. Given our purpose, however, we have formulated a category system that maps argument structures in terms of their substance, direction, and especially their relevance to issues in the policy process.

Limned throughout this comparison are the issues of sample size and intercoder reliability. Comparing reliability measures across studies is not always easy. The studies we will examine all report reliability results at varying levels of rigor. For example, Bengston and colleagues (1999) and Wilkins (1993) report percent measures only, one of them for a computer coding program. Others by McComas and Shanahan (1999) and Trumbo (1996) report measures using Scott's Pi, similar to the kappa we use because it accounts for chance agreement. The fact that these studies report intercoder reliability results at all reflects well on them as recent research shows between one third to half of content analysis studies in mass communication are published without them. Lombard and colleagues' study (2002) of 200 research reports published in the communication literature between 1994 and 1998 found that only 69 percent of studies using content analysis reported intercoder reliability results. Of these the lowest reported score was .40 and the mean minimum acceptable reliability level was .75. Our test of three coders exceeded this minimum (by percent) in all coding categories.

The method used by Trumbo (1996: p. 270) to examine headlines and leads in news articles about climate change sought to understand "who gains access to media representation; and what overall themes emerge in the media treatment of an issue." The study examined

252 articles written between 1985 and 1994 in the Washington Post, LA Times, Christian Science Monitor, and the Wall Street Journal. The researchers identified relationships over time between three groups of claims makers – scientists, politicians, and interest groups – and the principal news frame of each story, defined as “the claim that is being made by the media at the top of the inverted pyramid” (Trumbo, 1996: p. 271). Four recurrent themes were found: (1) defining problems, (2) diagnosing causes, (3) making moral judgments, and (4) suggesting remedies. Additionally, the study discerned from the data three phases in the news coverage – pre-controversy, controversy, and post-controversy.

Trumbo concludes, among other findings, that scientists were largely associated with the problem and causes frames. Further, he found that “scientists found themselves sharing a shrinking proportion of growing news media attention during an important part of the public debate over climate change” (Trumbo, 1996: p. 281). For intercoder reliability, the study reports a Scott’s Pi score of .78. Like ours, this method provides a way to monitor the activity of a stakeholder group relative to news media content and it features some categories similar to our own. But for our purposes, it is a comparatively incomplete and blunt instrument. Unlike our system, it cannot focus on the content’s direction relative to a specific policy. It has far fewer substance categories – four versus 21 – and is used only to examine headlines and leads. We can assign multiple substance codes to a single article. This method assigns only one per story. Thus, our categorical system yields more finely scaled maps of the rhetorical landscape.

Bengston and colleagues monitored “the social environment for natural resource management” using a computer content analysis of 30,000 online news articles (Bengston et al., 1999: p. 181). They coded articles for words and phrases associated with recreational, commodity, ecological, and aesthetic values of forests and then graphed the frequency of expressions in each category to map trends by quarter between 1992 and 1996. Their computer program successfully coded phrases between 85 and 87 percent of the time. The researchers found that expressions in the recreational and aesthetic categories trended upwards. Similar to our study, this one plots trends in the news media over time in predetermined categories. The size of their data sample, made possible by use of computer algorithms, is impressive. The key difference is that this method codes only for four mutually exclusive substance categories. The method does not compare content relative to a specific policy and does not take into account direction, stakeholders, or the policy process. Again, our categorical system exposes more dimensions of the rhetorical landscape.

In a study of news articles about climate change, McComas explores whether “narrative factors explain change in media coverage of global warming over time” (McComas and Shanahan, 1999: p. 38). The study of 312 articles, written between 1980 and 1985 in the New York Times and Washington Post, records the presence of eight “themes.” Three of them – international relations, economics/costs of remedy, and domestic politics – match three of our substance categories. In addition, the authors kept tabs on two “consequences” of climate change: change in temperatures predicted and the time range predicted for changes to occur. In an extensive accounting of their efforts to ensure intercoder reliability, the authors report scores of .6 for coding themes and .79 for consequences using Scott’s Pi. Themes and consequences were compared to the frequency of climate change news coverage in the sample.

The study found, among other things, that during a phase of increasing news coverage, stories focused great attention on the consequences and implied danger of climate change. “From a narrative standpoint,” wrote the authors, “news coverage in the late 1980s had set up an atmosphere in which global warming was an imminent disaster” (McComas and Shanahan, 1999: p. 52). The discussion considers the implication that such prediction could discourage media attention to the issue. This approach is useful for gauging the tenor of news



coverage surrounding a policy problem. In the case of its “consequences” categories, and themes related to research and science, it is capable of providing very specific information on intelligence gathering efforts. That said, this system, like the others discussed so far, is not designed for evaluating the direction of arguments specific to a policy’s goals. Moreover, apart from a theme that explicitly tracks “controversy among scientists,” the method has no means of discerning other participants and so cannot be used to comprehensively map the rhetorical landscape that is relevant to the policy sciences framework’s social or decision processes.

A study by Wilkins (1993) analyzed U.S. news stories about climate change from 1987 to 1989 to discern values that help frame news about the greenhouse effect. The author billed this study as a “qualitative analysis with (quantitative supporting information)” (Wilkins, 1993: p. 75). A wide array of information was collected:

Coding categories included the media outlet, the month and year the story was produced, whether the stories were news, feature or opinion, the number and type of sources cited, the news peg, the amount of coverage devoted to the greenhouse in each story, the metaphors used, whether the story discussed the future, and how politics was treated in each piece (Wilkins, 1993: p. 75).

In all, 1441 articles from the New York Times, LA Times, Washington Post, The AP and Time Magazine were coded with intercoder reliability measured at .85 using a straight percent measure. The study concluded that three yet unexplained values help frame news coverage of climate change: progress, the institutionalization of knowledge, and innocence. The sample size and scope of information collected for this study by human coders is considerable. In addition to enabling an analysis of themes, this approach seems to have potential for describing social process within the coverage, for example, by comparing actor data with news pegs and metaphors. But it’s unclear from the article whether these can be linked, as Trumbo’s study linked news frames with actors. Like the previously described methods, this one is not designed to seek and code arguments focused on any selected policy. Moreover, it does not enable layered coding of these arguments to describe or link them to the policy process.

In a study of news coverage of climate change from 1986 to 1995, Zehr (2000: p. 85) reports that the news media used the theme of scientific uncertainty in climate change reports “to create an exclusionary boundary between ‘the public’ and climate change scientists” which “delegitimated lay knowledge.” Unlike the previous studies, the methodology here is not thoroughly explained. Codes are not listed and no measures of reliability are reported. By contrast, we stress transparency, and have adhered as much as possible to the standards outlined by Neuendorf.

Finally, we want to address the methodology of news media trend analysis that has gained widespread attention in the popular press and in the for-profit analysis market. Often cited is the work of Naisbitt (1982), whose systematic analysis of news media content sparked an industry of trend analysis of economics, government, and society to the benefit of decision makers. Fundamental to this approach is monitoring what appears in the “news hole” – that essentially fixed amount of space the news media has to fill with reports.

In this forced-choice situation, societies add new preoccupations and forget old ones. In keeping track of the ones that are added and the ones that are given up, we are in a sense measuring the changing share of the market that competing social concerns command (Naisbitt, 1982: p. 4).

Merriam and Makower (1988: p. 4) explain that trend watching using this approach is essentially taking measure of “what the public is learning, what it wants to know, and what it

chooses to ignore.” It is essentially a modern adaptation of the approach taken by the military in World War II, with Lasswell’s help, to understand the Germans. Taking for granted the fact that what appears in the “news hole” reflects and influences public opinion, our approach applies additional, original filters for disclosing what is relevant to a specific set of policy goals and principles. That makes our approach unique and valuable for policy analysis. Further, our method is not proprietary. It is an open source code for all to use and it is highly transparent. In sum, the above studies demonstrate an array of coding systems that encompass elements of our approach. Each system is highly appropriate for its respective task. But each falls well short of providing a category system that fulfills the purpose for which we designed our method: to describe and map trends surrounding the development of specific policies using the categories of Lasswell’s policy sciences analytic framework.

### Methodological issues

The introduction of our categorical coding system would not be complete without an accounting of the difficult issues that have arisen in light of our experience with this application. We provide responses to those issues here as a vehicle for further exploring our method’s assumptions and limitations.

*News articles are not an objective form of data. They are subjective.* We have collected our data from news organizations with experienced reporters, codified ethical standards, and a wide audience. However, regardless of whether their prose is objective, we are interested in the arguments contained within them, which, beyond being biased, are capable of directly influencing policy (Nelkin, 1995) and, thus, are essential to any conclusions an analyst might reach about the rhetorical landscape. Content analysis neither gets at excluded positions nor is sensitive to the possibility that positions on issues are represented disproportionately in journalistic accounts. Indeed on some occasions, journalists, in the laudable name of objectivity, promote as equal in size less popular positions in an effort to give balance to alternative views on issues (Jamieson and Campbell, 1988).

*News media articles offer only a limited sample of information and opinions.* We are engaged in what qualitative researchers call “purposeful” or “criterion-based” sampling. Maxwell (1996: p. 70) describes it as “a strategy in which particular settings, persons or events are selected deliberately in order to provide important information that cannot be gotten as well from other choices.” While the world is full of people with good ideas, we are interested in those who are getting them across to shape policy. One of our assumptions is that in a democratic society with competitive markets and press freedoms many of those voices and ideas do appear in the news media. This question, however, points up an import blind spot in our data. News stories generally say nothing of the extent of campaigns by interest groups to gain favorable coverage. Recall that in the course of making stratospheric ozone policy, U.S. government agencies worked to press their case through the news media to educate the public and build the political will for a solution (Benedick, 1998). Efforts by sources to pitch stories or spin news coverage are often reflected in the final product but as often are not explicitly discussed in the stories themselves along with other factors that influence reporters’ and editors’ choices behind the scenes. This is often left to an ombudsman – when media outlets have one – to explain in the wake of particularly controversial stories. This observation is based on one of the author’s experience as a professional news reporter, editor, and freelancer.

*Your findings can be manipulated (wittingly or not) by the selection and sample size of your articles. For example, if you sample media in a nation opposed to the protocol, you might get a very different picture.* This is a valid point. Our method is geared to enable analysts

to draw conclusions about an international policy's potential for success or failure within a particular country – thus the distinction between “Local” and “Transboundary” arguments. Our data sources – The AP, UPI, and New York Times – are based in the United States but provide international coverage. A similar study could be conducted using French media – Le Monde and Agence Press France, for example – with “Local” meaning within France's borders. The conclusions would speak to the potential for the protocol's success in France. This is where the reliability, and more importantly, the complete transparency of our method is crucial. Our sampling and individual coding decisions are there for all to see, question, and debate.

*Your method is rigged to reduce complex ideas into neat little boxes for analysis. But the real world is not a series of “for” and “against” statements in such boxes; there is a lot of gray.* Natural and social systems are dynamic and complex but that is no excuse for avoiding the use of systematic methods to characterize their complexity. Far from reductionist, our method embraces the notion that arguments can overlap and interact over time and space. It is up to the analyst, who has freedom to reason about what the data are telling him or her, to draw conclusions about its significance.

*Human coding is slow.* Coding can be time consuming, but what our method lacks in efficiency, it makes up in thoroughness and transparency. Guidelines for researchers and coders are explicit and the product of their work at all stages – from article selection, to coding decisions, to conclusions drawn from the data – can be made available for scrutiny.

## Future research directions

Beyond these issues, we hope our approach inspires others to use news media content analysis to inform policy sciences investigations. As many studies have affirmed, content analysis as a methodology has a place in informing policy decisions, and news reports are an ideal source of data rich in context and consequence for both public opinion and policy making. In this article, we introduced a systematic, transparent and rigorous news media content analysis system to take advantage of this potential, specifically, for use with the policy sciences analytic framework. A review of content analysis literature shows that a combination of assets sets our approach apart – in both structure and purpose – from other methodologies.

We have extended this study on the Montreal Protocol to articles written up to the end of 2004 and are working on a parallel study of news coverage relevant to the Kyoto Protocol of the international climate change policy regime. These efforts include structured interviews with news reporters and policy makers involved with both protocols to place our findings in deeper context. So far, the younger Kyoto accord has failed to win acceptance by the U.S. government and we are interested to know what differences exist between the rhetorical landscapes surrounding each policy. Hidden here, in the elements of social and decision processes that we can extract from our data maps, are lessons about what has made the Montreal Protocol a relative success in the United States and the Kyoto Protocol a failure.

Communication scholars and policy scientists alike acknowledge a debt to Lasswell for pioneering the use of content analysis and the policy sciences analytic framework. But few, if any, have taken him up on his suggestion to build bridges between them. We hope our small contribution can help scholars begin to realize the benefits Lasswell saw in doing just that.

**Acknowledgements** We would like to thank our anonymous reviewers for their hard work and thoughtful criticism of our manuscript. Also thanks to Dr. Becky Warner for help with statistics, and Roger Pace and George Hurtt for their feedback on our early drafts. Thanks especially to our undergraduate coders, Ingrid Nugent and Brian Topping, for testing our method.

## References

- Atlas, ti. (2003). *The Knowledge Workbench WIN 4.2 (Build 058)*. Berlin: Scientific Software Development.
- Benedick, R.E. (1998). *Ozone Diplomacy (2nd ed)*. Cambridge: Harvard University Press, Original edition 1991.
- Bengston, D.N., Fan, D.P., & Celarier, D.N. (1999). A new approach to monitoring the social environment for natural resource management and policy: the case of U.S. national forest benefits and values. *Journal of Environmental Management*, 56, 181–193.
- Bitzer, L.F. (1959). Aristotle's Enthymeme revisited. *Quarterly Journal of Speech*, 45, 399–408.
- Brewer, G.D., & deLeon, P. (1983). *The foundations of policy analysis*. Homewood, Illinois: The Dorsey Press.
- Brockriede, W.E., & Ehninger, D. (1960). Toulmin on argument: an interpretation and application. *Quarterly Journal of Speech*, 46, 44–53.
- Clark, T.W. (2002). *The policy process, a practical guide for natural resource professionals*. New Haven, CT: Yale University Press.
- Connell, C. (1982). *Experts at the National Academy of Sciences*. The Associated Press, March 31.
- Danielson, W.A., & Lasorsa, D.L. (1997). Perceptions of social change: 100 years of front-page content in the New York times and the Los Angeles Times. In C.W. Roberts (Ed.) *Text Analysis for the Social Sciences, Methods for Drawing Statistical Inferences from Texts and Transcripts*. Mahwah, NJ: Lawrence Erlbaum Associates Inc.
- Darst, G. (1987a). *Researcher says evidence in depletion case is strong but incomplete*. The Associated Press, May 12.
- Darst, G. (1987b). *Hodel offends environmentalists with lotion-and-hats policy*. The Associated Press, May 30.
- Dixon, L.T., & Linz, D. (2002). Television News, prejudicial pretrial publicity, and the depiction of race. *Journal of Broadcasting and Electronic Media*, 46(1).
- Dryzek, J.S. (1997). *The politics of the earth, environmental discourses*. New York: Oxford University Press.
- Freudenheim, M., Clarity, J.F., & Mansnerus, L. (1986). *Chemicals linked to an ozone 'hole'*. The New York Times, October 26.
- Goeller, D. (1987a). *McDonald's to stop serving U.S. customers food in containers made with CFCs*. The Associated Press, August 5.
- Goeller, D. (1987b). *Scientists: greater reductions needed in ozone-destroying chemicals*. The Associated Press, October 27.
- Gottschalk, L.A., Fronczek, J., & Buchsbaum, M.S. (1993). The cerebral neurobiology of hope and hopelessness. *Psychiatry*, 56(3), 270–281.
- Hauser, G.A. (1986). *Introduction to rhetorical theory*. New York: Harper and Row, Publishers Inc.
- Henslin, J.M., & Roesti, P.M. (1976). Trends and topics in "social problems" 1953–1975: a content analysis and a critique. *Social Problems*, 24(1), 54–68.
- Howland, D., Becker, M., & Sahagian, D. (2001). Globalization and climate change. *Global Change Newsletter*, (48).
- Huebner, J., Fan, D.P., & Finnegan, J. (1997). Death by a thousand cuts: the impact of media coverage on public opinion about Clinton's Health Security Act. *Journal of Health Communication*, 2(4), 253–270.
- Jamieson, K.H., & Campbell, K.K. (1988). *The interplay of influence: mass media and their publics in news, advertising, politics*. Belmont, CA: Wadsworth Publishing Company.
- Jordan, D.L., & Page, B.I. (1992). Shaping foreign policy opinions: the role of TV news. *The Journal of Conflict Resolution*, 36(2), 227–241.
- Kappa (2003). Medical University of South Carolina 2000 [cited 2003]. Available from <http://www.musc.edu/dc/icrebm/kappa.html>.
- Korsmo, F.L. (1990). Problem definition and the Alaska natives: ethnic identity and policy formation. *Policy Studies Review*, 9(2), 294–306.
- Landis, J.R., & Koch, G.G. (1977). The measurement of observer agreement for categorical data. *Biometrics*, 33, 159–174.
- Lang, G.E., & Lang, K. (1983). *The battle for public opinion*. New York: Columbia University Press.
- Lasswell, H.D. (1968). The uses of content analysis data in studying social change. *Social Science Information*, 7(1), 57–70.
- Lasswell, H.D. (1971). *A pre-view of the policy sciences*. New York: American Elsevier.
- Lasswell, H.D. (1972). Communications research and public policy. *Public Opinion Quarterly*, 36(3), 301.
- Lasswell, H.D., Lerner, D., & Pool, I.de.S. (1952). *The comparative study of symbols*. Stanford, CA: Stanford University Press.
- Lombard, M., Snyder-Duch, J., & Bracken, C.C. (2002). Content analysis in mass communication assessment and reporting of intercoder reliability. *Human Communications Research*, 28(4), 587–604.

- Malone, M.D., & Orthner, D.K. (1988). Infant care as a parent education resource: recent trends in care issues. *Family Relations*, 37, 367–372.
- Mastro, D.E., & Atkin, C. (2002). Exposure to alcohol billboards and beliefs and attitudes toward drinking among Mexican American high school students. *The Howard Journal of Communication*, 13, 129–151.
- Maxwell, J.A. (1996). *Qualitative research design, an interactive approach*. Vol. 41. Applied Social Research Methods Series. Sage Publications.
- McComas, K., & Shanahan, J. (1999). Telling stories about global climate change measuring the impact of narratives on issue cycles. *Communication Research*, 26(1), 30–57.
- Merriam, J.E., & Makower, J. (1988). *TrendWatching: how the media create trends and how to be the first to uncover them*. New York: American Management Association.
- Musso, J., Weare, C., & Hale, M. (2000). Designing Web technologies for local governance reform: good management or good democracy? *Political Communications*, 17(1), 1–19.
- Naisbitt, J. (1982). *Megatrends: ten new directions transforming our lives*. New York: Warner Books Inc.
- NASA team plans to investigate ozone hole above the Antarctic. (1987). The Associated Press, July 30.
- Nelkin, D. (1995). *Selling Science*. New York: W.H. Freeman and Company.
- Neuendorf, K.A. (2002). *The content analysis guidebook*. Thousand Oaks, CA: Sage.
- Schrandt, P.A. (2001). Potentials and pitfalls in the application of event data to the study of international mediation. Paper read at International Studies Association 41st Annual Convention, at Los Angeles, CA.
- Schwandt, T.A. (1997). *Qualitative Inquiry: a dictionary of terms*. London: Sage Publications Inc.
- Siegel, L. (1987). *Theory blames ozone loss on snowballs from space*. The Associated Press, May 27.
- Stern, S.R. (2005). Messages from teens on the big screen: smoking, drinking, and drug use in teen-centered films. *Journal of Health Communication*, 10(4), 331–346.
- Stone, P.J. (1997). Thematic text analysis: new agendas for analyzing text content. In C.W. Roberts (Ed.), *Text Analysis for the Social Sciences, Methods for Drawing Statistical Inferences from Texts and Transcripts*. Mahwah, NJ: Lawrence Erlbaum Associates Inc.
- Sullivan, W. (1987). Ozone hole raising concern for scientists' safety. *The New York Times*. October 28, 13.
- Taber, S.C. (1992). POLI: An expert system model of U.S. foreign policy belief systems. *The American Political Science Review*, 86(4), 888–904.
- The Associated Press (2003) The AP's Mission. 2003 [cited 2003]. Available from <http://www.ap.org/pages/history/mission.htm>.
- The New York Times. *Ethical Journalism, Journalism Ethical Code of Conduct for the News and Editorial Departments* (2003) [cited 2003]. Available from <https://www.nytc.com/pdf/nyt-code-of-ethics-1-03.pdf>.
- Toulmin, S. (1958). *The Uses of Argument*. London: Cambridge University Press.
- Toulmin, S., Rieke, R., & Janik, A. (1979). *An introduction to reasoning*. New York: Macmillan Publishing Co., Inc.
- Trumbo, C. (1995). Longitudinal modeling of public issues: an application of the agenda-setting process to the issue of global warming. *Journalism and Mass Communication Monographs*, (152), 1–57.
- Trumbo, C. (1996). Constructing climate change: claims and frames in U.S. news coverage of an environmental issue. *Public Understanding of Science*, 5, 269–283.
- UNEP. (1987). The Montreal protocol on substances that deplete the ozone layer. In Benedick, *Ozone Diplomacy*. Cambridge: Harvard University Press.
- United Press International (2003) *About Us 2002* [cited 2003]. Available from <http://www.upi.com/about/index.cfm>.
- Wanta, W., Golan, G., & Cheolhan, L. (2004). Agenda setting and international news: media influence on public perceptions of foreign nations. *Journalism and Mass Communication Quarterly*, 81(2), 364–377.
- Weber, R.P. (1990). *Basic Content Analysis*. Second ed. Newbury Park, CA: Sage.
- Wilkins, L. (1993). Between facts and values: print media coverage of the greenhouse effect, 1987–1990. *Public Understanding of Science*, 2, 71–84.
- Woodward, G.C., & Denton, R.E. (2000). *Persuasion and Influence in American Life*. (4th ed.) Prospect Heights, IL: Waveland Press.
- Zehr, S.C. (2000). Public representations of scientific uncertainty about global climate change. *Public Understanding of Science*, 9, 85–103.