

THESIS

DISCOURSE ANALYSIS OF MEDIA COVERAGE OF CLIMATE CHANGE

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ABSTRACT

DISCOURSE ANALYSIS OF MEDIA COVERAGE OF CLIMATE CHANGE

This qualitative study uses discourse analysis to measure the influence of severe weather events on the coverage of climate change in the U.K. and U.S. news magazines over an eleven-year period from 1996 through 2006. Downs' Issue-Attention Cycle, the use of stance words, social manipulation and the framing of science and environmental articles are used to measure the extent to which severe weather events are exploited to imply the presence of climate change. The study found that, while severe weather events may subtly influence the frequency of coverage of climate change, they do not appear to be the primary driving factor. Political events—and in particular, the disparity between climate change views held in Washington, D.C. from those held in much of the rest of the world—appear to have motivated the news media in both the U.S. and U.K. to place a greater emphasis on the issue.

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Discourse Analysis of Media Coverage of Climate Change

From Moscow last week came the news that Professor N. N. Zupoff of the Soviet Meteorological Institute of the Northern Sea Administration and Professor L. Berg of the Soviet Academy of Sciences conclude that the Arctic, and probably the world, may be growing warmer. Neither new nor rash is this pronouncement. For a decade and more Soviet meteorologists have been recording the vagaries of Arctic weather. (Kaempffert, 1938, p. 63)

Though the issue of climate change became prominent in the 1980s, the previous article, printed in the *New York Times* on December 18, 1938, suggests the issue is not new at all. The same article notes scientists had observed increasing temperatures in the United States starting from the year 1929. Research conducted in the Arctic suggested those increases were believed, even then, to be applicable worldwide.

Given that scientists have observed climate change for several decades, it seems astounding that the belief in anthropomorphic climate change is so low among both the public and politicians in the U.S., especially as compared to other parts of the developed world such as Europe. The purpose of this study is to compare the U.S. media approach to weather and climate coverage to that in the U.K. in an effort to see how they differ, as well to look for evidence of possible U.S. media attempts to compensate for lagging public support.

In 1939, the year after the previously mentioned *Times* article appeared, Guy Stewart Callendar, speaking before the Royal Meteorological Society in London, placed the blame for this warming trend exactly where it is placed today: carbon dioxide (CO₂) emitted from the burning of fossil fuels. However, Callendar, an engineer with an amateur interest in climate, was accused of selectively choosing data to support his case (Weart, 2003).

Eighty years prior to this, in 1859, British scientist John Tyndall negated a common belief by scientists that all gases were “transparent” to infrared radiation. He discovered that, while certain gases—like oxygen and nitrogen—are transparent to the sun’s rays, certain gases—

including both carbon dioxide, methane and water vapor (H₂O)—were opaque. These opaque gases came to be known as “greenhouse gases” (Weart, 2003). In 1896, Swedish scientist Svante Arrhenius first calculated that doubling the CO₂ in the atmosphere would raise the Earth’s temperature by 5 or 6 degrees Celsius (Weart, 2003).

Aside from scientific journals, the topic of climate change has been in the media for over 80 years, though initially it was not considered a concern; in some cases, it was seen as an asset to food production. Later, driven by the Cold War, there was also a growing military interest in both predicting and strategically controlling the weather in localized areas, such as through cloud seeding. At the same time, the invention of the digital computer and newly discovered radiocarbon measurement techniques enhanced the ability to observe and model atmospheric and oceanographic activity (Weart, 2003).

However, as far back as the 1950’s, there was also a concern that human activities—at the time the testing of the atomic bomb—might *inadvertently* affect the weather (Namias, 1951; Text of the Digest of Findings and Recommendations on Effects of Radiation, 1956; Weart, 2003).

Reports from the 1950’s also hinted at a continuing concern about the growth of CO₂ in the atmosphere, and the possibility it might warm the climate (Kaempffert, 1956). As of the late 1950’s and early 1960’s, U.S. scientists Roger Revelle and Charles Keeling were beginning to document the rise in CO₂ levels. Al Gore would later use their data in his 2006 film, *An Inconvenient Truth* (Weart, 2003).

Also during the 1960’s, concern shifted from atomic bomb testing to other byproducts of human ingenuity, such as jet contrails produced by supersonic jets (Sullivan, 1965; Weart, 2003). This, along with the first Earth Day celebration in 1970 (Hill, 1970) signaled a growing

awareness of the interaction of humanity with the environment. At the same time, enhancements in computer technology allowed the increased use of computer modeling of the environment by scientists (Lynch, 2008), allowing them to observe and predict climate changes as well as measure the anthropogenic (human caused) influences on those changes.

Today, a majority of U.S. scientists (84 percent) believe human activity is a major factor in the current climate fluctuation; 70 percent believe climate change represents a serious problem (Pew Research Center for the People & the Press, 2009). A recent analysis of peer-reviewed scientific literature found that 66 percent of abstracts expressed no position on anthropogenic global warming; however, of those that did express a position, 97 percent endorsed the consensus that climate change is caused by human activity (Cook, et al., 2013).

By contrast, public perceptions of the existence and importance of climate change are almost evenly divided, and are influenced by factors like partisan affiliation, ideology and educational level. In addition, the same Pew Research study found that individuals who believed climate change exists and is human caused were more likely than those who did not to perceive consensus on the part of scientists, and that a sizeable minority of the public (35 percent) believes there is less consensus among scientists than actually exists.

Indeed, climate can also change for reasons other than human activity. The Milankovitch Theory, named after Serbian engineer, Milutin Milankovitch (Weart, 2003), posits three reasons for such changes. The first is the tilt of the earth on its axis, at present 23.5 degrees, can range over a 40,000-year cycle from 22.5 degrees to 24.5 degrees. A second factor is eccentricity, deviations in the earth's orbit around the sun that run in a 100,000-year cycle. A third is precession, a change in the direction of the earth's axis that occurs over a 20,000 to 25,000 year cycle. These changes have coincided with past ice ages (Maloney, 2008). Volcanic eruptions

and variations in solar activity are other natural causes of climate change (Ahrens, 2009), as are other short-term cyclic variations such as El Niño and La Niña.

History records evidence of numerous such temperature shifts, even at times when human activity was not likely to play a significant role. But though climate changes throughout history can be reconstructed through examining such evidence as lake-bottom sediment, geologic structure, written historical records, ice core samples and borehole temperature profiles, the cause of those changes is often uncertain (Ahrens, 2009).

Such uncertainty is mentioned in the previously quoted *New York Times* article, which continues:

Not until we have observations extending over a thousand years and longer will it be possible to decide whether the trend that has been observed is merely an upward swing in a cycle of changes that cover twenty or thirty thousand years or whether it is something permanent, if we can speak of permanence at all in a constantly changing universe (Kaempffert, 1938, December 18, p. 63).

Because of this scientific uncertainty, the problem from a journalistic perspective is to convey the potential for anthropogenic climate change in a credible fashion to an audience accustomed to expect news to deal with actual current events rather than possible future events. In order to analyze how this is being accomplished, the observer can start by considering how science articles are framed, in particular those that focus on environmental issues like climate change. But beyond the framing of articles, it is helpful to look at the type of arguments used to support or refute the case for climate change. Some of these arguments may be overt, such as those used in persuasive articles. Others may be covert or even unintentional on the part of magazine staff, in articles that are written to report an event rather than to persuade.

Such overt or covert arguments can be exposed using a technique called discourse analysis. Discourse analysis is a technique for recognizing misleading language in a document

that not only allows one to recognize subtle editorial biases, but to read in a qualitative fashion the cultural contexts in which a topic is covered. Such an analysis will convey a broader picture of how the style used in writing climate-related articles may influence public perception of climate change.

In particular, comparing the United States (U.S.) discourse on climate change with similar discourse in the United Kingdom (U.K.) may reveal much about the different cultural and political environments in which the issue is covered, as well as potential explanations for differing audience effects. The fact that the U.S., unlike the U.K., was one of the few nations that refused to sign the Kyoto Accord (Borenstein, 2009; Drozdiak, 2000) suggests political, industrial and ideological differences exist between the U.S. and the U.K., differences that may be reflected in the media as well.

Literature Review

Framing of Articles

“A news frame suggests how events and issues should be viewed by readers and viewers”

(Hendrickson & Tankard, 1997, p. 39). According to Entman:

Framing essentially involves *selection* and *salience*. To frame is to *select some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation* for the item described. (1993, p. 52) [Italics in original.]

By selecting and making a story salient, an article’s frame can influence how an audience interprets that story. In this regard, studying the way an article is framed provides a more sophisticated means of analyzing news coverage than by simply looking at positive, neutral or negative media bias. The framing of a story can often be detected through such devices as headlines, beginning paragraphs and “nut graphs,” an early paragraph defining what the article is about (Severin & Tankard, 2001).

Pompper (2004) states that the use of framing—described as combining words in a way to create meaning—may appear innocuous, but results in news that is far from objective. However, Entman (1993) notes that article salience is not created only by the word combinations themselves, but is an interaction of both the text within an article, and the schemata in the reader’s belief system. From a conceptual perspective, framing “plays the same role in analyzing media discourse that schema does in cognitive psychology” (Gamson, Croteau, Hoynes, & Sasson, 1992, p. 384). Thus, framing in and of itself may not guarantee audience influence, and may even be vulnerable to different decoding by different audience members (Entman, 1993; Gamson et al., 1992).

Framing focuses on “the human agency component of newsmaking” (Pompper, 2004, p. 102). The ambiguity of the term frame carries implications both of a picture frame and the frame of a building, though most researchers hold to the latter structural sense of the term (Gamson et al., 1992).

The framing of the story is also influenced by the event the story is intended to cover. Hard news tends to be event-driven, with the media itself putting such events in a scientific context (Corbett & Durfee, 2004). The event that spurred the story is likely to influence the story frame, which will differ depending on the type of story. For example, the media would use a different frame for a diplomatic event such as the Kyoto Protocol, a scientific event like the announcement of the results of a polar ice cap study or a natural disaster as a result of severe weather such as Hurricane Katrina, because a diplomatic event or scientific event would entail interviewing almost exclusively government sources who will tend to frame the story in the way that reflects best on their party or organization (Entman, 2007). The announcement of a scientific discovery may entail using similar public relations strategies. On the other hand, scientists, individuals and government sources affected by a natural disaster or weather event usually have less time to prepare strategically in advance of an interview; even if they do, the description of the event is more likely to be reported using a story frame, rather than an issue frame (Gamson et al., 1992), though later articles may bring in issues like government oversight, environmental issues or technological failures.

It is worth noting that many framing studies are applied to newspapers, while this study uses magazines. News magazine articles generally go into greater depth, often exploring multiple aspects of an issue and thus may not be limited to a single article frame. However, framing studies do exist that examine both newspapers and magazines (Johnson, 2000).

Framing of Science Articles

The technical language of scientific discourse has also influenced the framing of science articles. Over the past 70 years, the language of science has diverged from that of non-scientific discourse, thus limiting the ability of a broad audience to interpret meaning from those articles (Shortland & Gregory, 1991). The authors cite an example of a 1920 article from *Nature*, which uses more standard literary terms and less jargon to describe a genetic concept than a comparable example given from a more recent article in the same magazine. Though this stylistic change was intended to make science-writing sound more scholarly and objective, it may strike the average reader as confusing.

Scientific literacy.

It is perhaps not surprising, then, that a survey by Treise and Weigold (2002) found the greatest desire among science communicators and researchers was to increase scientific literacy. But this becomes a challenge when the discourse itself is out of reach of the average person. Of particular concern among those surveyed was the framing of potential disasters such as the following:

Many of our respondents cited the recent imminent “meteor crashes to Earth killing hundreds of thousands.” One editor said it was the result of a “media machine hell-bent on entertaining with hype and sensationalism” and “using legitimate science and legitimate institutions [in this case, NASA] to scare the ... out of readers.” (Treise & Weigold, 2002, p. 318) (brackets in original).

Journalists may treat scientific views preferentially because scientific values “resonate with journalistic credos of subjectivity and objectivity” (Coleman & Dysart, 2005, p. 8). Both science and journalism share a methodology intended to promote dispassionate observation of the world. This leads to the assumption that both science and journalism are morally neutral.

To support their claim, Coleman and Dysart (2005) studied both the use of frames and framing devices such as headlines and leads in their case study of a burial ground controversy between scientists and Native Americans, relying on communitarian ethics—the responsibility of the individual to the community—as the basis of journalistic ethics. They found that, far from being morally neutral, journalistic accounts tended to portray the burial ground story in oversimplified, black and white terms, implying that science was rational and rationality was outside the governance of morality; thus, scientists had no moral responsibility to preserve the burial grounds of Native Americans.

By using “liberal examination of framing” authors addressed “issue selection; the use of particular sources, language and metaphors; and central themes” (Coleman & Dysart, 2005, p. 7). The authors were able to glean the shape of the discourse through close reading of news articles. Though this study focused only on issue framing, techniques like close reading and observation of cultural metaphors such as cowboys versus Indians (alluding to the 1950s cowboy Western view of Native Americans as barbarians) go beyond framing, and fit in with discourse analysis as well.

Cultural metaphors similar to those used for the Native American burial grounds have also been used in discourse centered on denying climate change. Such discourse often pits technological progress enabled by petroleum products, against sound science that suggests the use of such petroleum products produce harm to the environment. Examples of such arguments are found in Op-Ed advertorials from ExxonMobil carried in the *New York Times* in March and April of 2000. For example, the March 16 article said climate scientists “believe they can predict changes in climate decades from now,” and incorporated the Hippocratic Oath concept of “Do No Harm” (ExxonMobil, 2000). Because the Hippocratic Oath has for centuries been considered

a model of ethics in the medical field, the implication is that it is not the oil companies but scientists who are unethical. Thus, the real threat is not to the environment but to industrial progress (Livesey, 2002).

Conveying uncertainty.

Any discovery in science can be invalidated or altered by later research. Science journalists need to convey this uncertainty. A conflict arises when the need to convey uncertainty is superseded by the need to convey the potential of risks. We tell our children to wear a bicycle helmet, not because we are certain they are going to fall off their bike and hit their heads, but because, given the right set of circumstances, such an event is a strong possibility. The primary conflict with climate change discourse in the U.S. is the degree to which it is acceptable to convey with certainty the risks associated with climate change.

The framing of science articles plays a role in conveying uncertainty. Stocking (1999) notes the use of exaggerated claims, single sources, lack of historical context and the framing of science stories as a “triumphal quest,” comparable to the Star Trek mandate “to boldly go where no man has gone before.” On the other hand, the author states uncertainty may be conveyed through the use of words and phrases, such as “suggests” or “may,” caveats specifying the limits of available knowledge or results, as well as direct assertions that knowledge is preliminary or uncertain (Stocking, 1999).

Uncertainty is a particular issue in the coverage of environmental issues, of which climate change is an example.

Framing of Environmental Articles

The sources quoted in articles ultimately affect the framing of articles. Elite media like the *New York Times* or mainstream media like *USA Today* are more likely to make use of government and industry sources, simply because they have more legitimate access to them than

does tabloid media like the *National Enquirer*. Such elite sources, while potentially knowledgeable, may express different concerns than average citizens quoted in less reputable media, such as the *National Enquirer* (Pompper, 2004).

Another factor in framing of environmental articles is the “event” that inspired the original article. Many science articles are driven by scientific announcements. Because such announcements are often embargoed, a practice that entails giving journalists scientific papers a week in advance with the understanding that reporters agree to wait until the publication date to report on it (Siegfried, 2006), individual media lack the competitive opportunity to “scoop” other media outlets. Most science announcements are relatively mundane. Announcements like the discovery of a new star, animal species or cure for cancer happen infrequently. A diplomatic event, such as the Kyoto Treaty (Livesey, 2002; Carvalho, 2005), or a natural disaster, such as Hurricane Katrina (Durham, 2008) presents a unique opportunity to use a more compelling article frame. Because different types of events may influence the media differently in other countries, foreign media are also likely differ in their framing of articles (Murphy & Vileanu, 2005).

Media sources.

Pompper (2004) found that source selection was a factor in how stories were framed, with elite media (*New York Times*) including more governmental sources, the “mainstream” media (*USA Today*) interviewing more sources from the power and energy industry, and the *National Enquirer* interviewing more average people. In coverage of environmental stories, government sources focused more on public policy, industry on regulatory functions and individuals on health risks. None of the media included a significant percentage of special interest sources, which would have been most likely to oppose the status quo. However, the study was performed using artificial intelligence software that looked for word patterns in

articles, but did not break down the purpose of specific articles. This could have influenced the results as, for example, commentary in elite media may be directed toward a national audience of policy- and influence-makers.

Durham (2008) found a more populist coverage even among traditionally elite cable networks following Hurricane Katrina. Whether or not circumstances reduced the availability of traditional government sources, the human-interest element of news values mandated a focus on the victims.

International media.

In addition to different sources, the media and cultures of different countries may contribute to different public understanding of environmental risk issues. A study during the Cold War study by Andreyenkov, Robinson, and Popov (1989) found that Soviet teens were significantly more knowledgeable about issues related to nuclear war than American teens. Ninety-four percent of Soviet students knew about the U.S.S.R.'s pledge not to use nuclear weapons first as opposed to only 13 percent of U.S. students. Regarding the lack of a similar U.S. pledge, 68 percent of Soviet students were knowledgeable, compared to 17 percent of U.S. students.

American youth exceeded Soviets only in their knowledge of Star Wars, the popular name given to the Strategic Defense Initiative (SDI), a program introduced by President Ronald Reagan to defend America from nuclear weapons. Authors stated these statistics were “alarmingly low” for youth in an “information society,” though the disparity may be at least partly explained by a greater usage of the news media by Soviet students, the Soviet government control of that media, as well as a comparative unfamiliarity—perhaps even fear—of openly expressing opinions in written questionnaires. By contrast, U.S. students reported they were more likely to rely on schools and parents as a source of information (Andreyenkov, et al., 1989).

It should be noted the authors did not consider whether differences in the actual content of each nation's media coverage could have contributed to the discrepancy in young peoples' knowledge. It stands to reason policies that reflected more favorably on Soviet adherence to international nuclear treaties, as opposed to the superiority of American technology such as Star Wars, might have received more coverage in the U.S.S.R. than in the U.S.

Another study compared biotechnology frames used by reporters in the U.S. and France covering the topic of genetically modified foods. This study analyzed articles in the U.S. media (the *New York Times*, the *Washington Post*, and *USA Today*) with demographically similar French publications (*Le Monde*, *La Tribune*, and *Les Echos*) from 1998 through 2002 (Murphy & Vileanu, 2005). The study made use of neural network software to identify the importance of words based on frequency and content (Woelfel, 1993), locating catchphrases to determine each story's issue frame.

Media discourse in the French newspapers used six frames: labeling, safety, economics, risks, food quality, and politics and cost. In the U.S. media, the six frames were: safety, economics, risks, labeling, regulation, and the public. The study showed the frame by itself was not adequate to distinguish the differences in discourse between the international sources. While U.S. "safety" frames emphasized environmental safety, the French media focused on consumer safety. The U.S. "risk" frame emphasized allergy risks, while the French media referred to environmental, public health and production risks (Murphy & Vileanu, 2005).

Aside from frames, the U.S. media is more inclined to use a hard-news format, emphasizing detached point-of-view, verifiable facts and attributable quotes, while the European media is more likely to advocate for a specific perspective and use more indirect quotes (Esser & Umbricht, 2014). Esser and Umbricht describe the U.K. media approach as falling somewhere

between the hard news format of the U.S. media and the more literary style of the mainland European media. The article noted that all six news systems studied (U.S., Great Britain, Germany, Switzerland, France and Italy) had moved toward a more interpretive style since the 1960s.

Disaster events.

Both natural and manmade disasters events play a powerful role in media coverage. In their analysis of the risk communication response to the Chernobyl nuclear reactor accident, Earle and Cvetkovich (1995) observed the news media generally functioned appropriately in covering that event. However, the authors echoed common criticisms of the media in such cases: that they focus on events rather than the hazards that cause them and that they focus on hazards with catastrophic consequences but low probabilities.

In a content analysis of media coverage of Hurricane Hugo and the Loma Prieta earthquake, Hornig, Walters, and Templin (1991) analyzed the sources directly quoted in articles. As opposed to traditional science coverage, which is heavily influenced by the scientific sources that distribute them, information gathering from public agencies far more heavily influences disaster coverage. Nevertheless, because natural disaster coverage both draws from and contributes to the audience's perception of risk, disasters present the media with an opportunity to educate the public with technical background information on the disaster that would not otherwise be considered newsworthy (Hornig, et al., 1991).

Trumbo (1996) states that coverage of issues tends to run in cycles. Often initiated by a related event, the issue-attention cycle will run its course over time, influencing the framing of articles. Trumbo's (1996) study found 93 percent of stories fell into Entman's (1993) four purposes of frames, which are:

1. Define problems, which in the context of climate change is the impact of climate change;
2. Diagnose causes, including evidence as to the reality of climate change as a problem;
3. Make moral judgments, which might include blame-making or actions;
4. Suggest remedies, which would include providing specific solutions to the problem.

For example, an article written immediately after an event might focus on defining the problem or diagnosing its cause, while later articles may make moral judgments or suggest remedies.

Discourse Analysis

In general terms, discourse is written or spoken debate. Van Dijk (1991) defines discourse analysis as an interdisciplinary field that began in the mid-1960s and covers disciplines as diverse as linguistics, rhetoric, poetics, cognitive and social psychology, and sociology. Because news plays an important role in shaping public perception of the world and of our culture, a particular focal point of discourse analysis is the study of news reporting.

Manipulation in discourse.

Members of such groups as journalists, politicians and religious leaders function in society as opinion leaders, but also have the ability to selectively withhold information the average person does not have access to. Such withholding has the potential effect of leading the audience to believe an action is in its best interests, simply because the audience does not have enough information to know otherwise. This allows social domination by the groups who possess the information and the ability to engage in abuse of power, such as U.S. and U.K. intelligence information about “Weapons of Mass Destruction” in the period leading up to the invasion in Iraq (van Dijk, 2006).

Van Dijk (2006) says discursive manipulation can rely on three mechanisms:

1. Society: Social manipulation occurs through the power structures in society.
2. Cognition: Cognitive manipulation happens when a message activates *mental models*: prejudices, stereotypes or preconceived notions, corresponding to how the communicator wishes the audience to perceive his or her message. In society, this may entail defining an out-group, such as illegal immigrants, as inherently “evil,” a drain on or threat to society.
3. Discourse: Discourse manipulation can take place through text and language (linguistics), but also through non-verbal characteristics, such as gestures, layout and pictures.

Manipulative discourse is distinguished from persuasive discourse based on the level of political and cultural dominance held by the institution engaged in discourse, the withholding of necessary information from the dominated audience, and the probability the course of action is in the best interests of the dominant, as opposed to the dominated (van Dijk, 2006).

In another article Wodak notes the demarcation of “us” versus “them” is often a prevalent element of discourse, employing terms (in the case of immigration) like “migrant,” “refugee” and “asylum seeker” which have come to have the derogatory connotation of “foreigners who are not welcome” (2007, p. 657). Wodak goes on to observe, “the strategic and argumentative use of many linguistic indicators to construct in- and out-groups is fundamental to political discourses in all kinds of settings” (p. 661).

Thus, in the political discourse surrounding climate change, there are in- and out-group differentiations between those scientists who support the notion that climate change exists and is anthropocentric and those “deniers” who do not. In the intelligent design debate, Grimm argues such skewing of beliefs may lead to the phenomena of “dueling experts” and “false balance” (2009, p. 168), giving the impression of scientific controversy where little or none exists. This practice of balancing sources even radicalized a number of television weathercasters to publically oppose climate change theories, potentially influencing public opinion, because they are some of the most visible “experts” in meteorology in local communities and well-liked by

viewers who rate them as some of the most reputable journalists (Homans, 2010). Public relations writing for the oil industry may likewise attempt to conceal the fact the aforementioned is a minority, and in many cases is commissioned and paid for by industrial interests.

Because consensus is a primary goal in scientific research, in- and out-groups, in theory, should not exist; if they do they may either be portrayed as on the fringe or, conversely, as representative of the whole (*pars pro toto*) (Wodak, 2007, p. 662). Wodak offers the following relevant questions for analyzing such exclusionary discourse:

1. How are persons named and referred to linguistically?
2. What traits, characteristics, qualities, and features are attributed to them?
3. By means of what arguments and argumentation schemes do specific persons or social groups try to justify and legitimize the inclusion/exclusion of others?
4. From what perspective or point of view are these labels, attributions, and arguments expressed?
5. Are the respective utterances articulated overtly, are they even intensified or are they mitigated? (2007, p. 662)

Aside from simply knowing information, cultural elites—such as politicians, journalists, educators and others who comprise groups enjoying higher intellectual, social or economic status—have the ability to easily disseminate that information through various communication outlets. “Obviously, in order to be able to manipulate many others through text and talk one needs to have access to some form of textbooks, scientific articles, novels, TV shows, advertising, the internet, and so on” (van Dijk, 2006, p. 362).

Unlike traditional content analysis, which focuses primarily on text (in print media), discourse analysis is not limited to merely studying the text that comprises the news, but considers that content within “cognitive, social, cultural, or historical ‘contexts’” (van Dijk, 1991, p. 110). Discourse analysis considers *local coherence*, the relationships between stated facts, as well as *global coherence*, more commonly understood as themes or topics. In the news, topics occur primarily in the headline and lead paragraphs.

Implications of discourse.

Another discourse concept is that of *implication*. In most text, certain ideas are understood implicitly. If we say, *John is flying to London*, it is not necessary to explicitly state that he is flying on an airplane. Van Dijk notes, “The analysis of the ‘unsaid’ is sometimes more revealing than the study of what is actually expressed in the text” (1991, p. 114). Thus, it is necessary to analyze not only text, but also “cognitive representations and strategies used in the production and comprehension of the text” (p. 118). The use of implications is often unavoidable, as journalists generally know more about an event than they have space to explain in detail (van Dijk, 2008). Yet cognitive theories to understand how the audience will mentally fill in missing information are almost always “explicitly rejected, and therefore not perceived as relevant,” Wodak argues (2006, p. 181), in spite of research showing audiences invariably related news to personal experience, and even to lack of personal experience.

Stance words.

Along with implications, journalists can intentionally or unwittingly create a bias in an article through the use of stance words such as *obviously*, *clearly*, *apparently*, and *presumably*. Other examples of stance words include: *unfortunately*, *importantly*, *happily*, which express the speaker’s feelings about a claim; *certainly*, *obviously*, and *clearly* express the speaker’s sense of the reliability of a claim; *presumably*, *supposedly*, and *allegedly* express a speaker’s doubt for a claim. Such words can have the effect of making claims (where the writer lacks the authority to do so), as well as doubting or supporting claims of speakers quoted within the article (Lipari, 1996).

For example, Lipari found the word *obviously* has three modes: empirical, inferential and metalinguistic. In the first instance, the word legitimates the verifiable claim of the reporter or source, while in the latter two cases the word becomes “a rhetorical device, asserting certainty

where none exists” (1996, p. 827). By contrast, the author found the word *presumably* has two modes: when used with a modal verb such as *could*, *would* or *might*, it emphasizes affirmative possibility; when used in a clause with no modal verb it emphasizes doubt. Likewise, *nominalization* may be used when agents are unknown, have already been mentioned or when the focus of the discourse is on victims. While this concealing of agency may be appropriate in some contexts, it may be inappropriate to mitigate blame for events if the agent is an elite actor or organization that should be accountable to public scrutiny (van Dijk, 2008).

Biber and Finegan (1988) describe six categories of stance adverbs: *honestly*, *generally*, *surely*, *actually*, *maybe*, and *amazingly*. They found that *honestly* and *amazingly* adverbials occurred infrequently in a combined sample of several types of discourse, including news, literature and speeches. Biber and Finegan also found stance words were minimized in press and academic writing, prose forms in which readers expect statements to be supported by facts. Besides adverbs, the authors note that markers can also include modal verbs such as *might* and *should*, as well as “opinion” verbs like *believe*, *suppose*, *think*, and *appear*. In their cluster analysis study, Biber and Finegan “counted only those adverbial forms that function as stance markers in their context” (p. 9) and avoided phrases like “*an amazingly cheap dinner*” (p. 9) where it was not clear that the use of the stance word was added with the intent of influencing reader perceptions.

Climate Change Coverage

The occurrence of several Category 4 and 5 hurricanes in 2005 gave climate change saliency in the mainstream media. Climate researchers are not certain whether the warming of the ocean water that causes increased hurricane intensity is related to climate change or to cyclic factors. However, natural disasters like Hurricane Katrina—unlike more intangible elements of climate change—are major news events. Thus they afford an opportunity to focus on an

environmental issue that has likely been underreported in the U.S. news media as compared to that of other parts of the world (Brossard, Shanahan, & McComas, 2004; Trumbo, 1996).

Downs' issue-attention cycle.

Trumbo (1996) found that in the U.S. news media, climate change reporting has tended to follow a cycle, rising from obscurity, competitively pursued for a while and eventually disappearing. The study operationalized article frames as headings and lead paragraphs of news stories from the *New York Times*, the *Washington Post*, the *Los Angeles Times*, the *Christian Science Monitor*, and the *Wall Street Journal*, but excluded editorials, opinion columns, letters to the editor and advertisements.

One example of how events influence the attention cycle is the Congressional testimony given by NASA scientist Dr. James Hansen in 1988, which coincidentally occurred during a drought that affected 40 percent of the nation's counties, which was prominently covered by major newspapers across the country and gained the support of vice president and presidential candidate George H. W. Bush (Oreskes & Conway, 2010). Thus, both the political and weather event contributed in bringing climate change to the public's attention. However, a dearth of such events corresponds to declining public interest. As Trumbo (1996) states:

It is easy to understand the spike of attention associated with NASA scientist Dr. James Hansen's Congressional testimony (during the North American drought summer of 1988) that climate change has manifested itself. But the overall build-up and eventual decline of news coverage presents a more complex problem. The existence of a cycle of attention is clear (p. 273). [*parenthetical comment in original*].

If the 1988 drought had any influence on the coverage and impact of Dr. Hansen's testimony, it seems likely that other weather events might influence coverage as well. Not only might that include events in the U.S., such as drought or hurricanes, but it could also include overseas events, such as the 2003 heat wave in Europe that led to the deaths of 14,000 people in

France (Ahrens, 2009). In addition, scientists and environmental groups including Greenpeace blamed 2002 flooding of the Danube River in Eastern Europe on summer storms that were consistent with a warming climate (Green & Pohl, 2002). The previously quoted 1938 *New York Times* article notes the observation of receding glaciers in Greenland by Professor Ralph I. Belknap “some years ago” (Kaempffert, 1938, p. 63).

The Trumbo (1996) study used Downs’ issue-attention cycle (Downs, 1972), along with an understanding of environmental and other significant events, as a means of interpreting the peaks and valleys of media coverage of climate change over the 10-year period from 1985 through 1995. The cycle presumes five stages:

1. Pre-problem, at which point experts recognize a problem exists but the public is not yet aware of it;
2. Alarmed discovery and euphoric enthusiasm, during which the public becomes aware and alarmed about the problem, but confident of society’s ability to resolve it, an optimism that Downs (1972) states is driven by an American tradition of viewing most obstacles as external rather than intrinsic to societal structure;
3. Realizing the cost, when the public realizes it will be difficult to solve the problem and politicians realize the problem may even be caused by a condition that benefits society;
4. Gradual decline of interest driven by discouragement, avoidance due to fear, and boredom, possibly caused by the distraction of newer concerns;
5. Post-problem, a state in which the media/public show a declined or spasmodic interest in the problem (Downs, 1972, p. 39).

While Downs is merely a model, based on assumptions and not survey research, studies that have used Downs’ Issue-Attention Cycle tend to support most of its premise as a valid explanation for cycles in public interest in environmental as well as foreign policy issues (Petersen, 2009; Soroka, Farnsworth, Young, & Lawlor, 2012).

Downs (1972) notes that this cycle is not so much driven by actual crises as by the interaction between a profit-driven news media and a public that consumes news in part for its

entertainment value. Thus, “a problem must be dramatic and exciting to maintain public interest” (p. 48).

One surprising element of the Trumbo (1996) study was the observation that, after the initial interest in the topic of climate change, scientists were for the most part left out of the debate in terms of being used as media sources. Though it was not clear whether scientists were squeezed out by other sources, or whether they distanced themselves from the debate, politicians and special interest groups represented an increasing share of sources quoted for climate change articles as time went on (1996).

Brossard, et al. (2004) also used Downs’ issue-attention cycle to perform a cross-national study related to climate change, finding the theory applied to the U.S. media coverage in the *New York Times*, but not the French media coverage in *Le Monde*. They state that “with global climate change, a major issue is the relative culpability of the United States as both a cause and a solution to the problem...in the French media, then, the controversy is not scientific but one of international diplomacy” (Brossard, et al., 2004, p. 354).

In the *New York Times*, media attention to climate change dropped off beginning in the late 1980s, as also observed by Trumbo (1996). However, there was no similar pattern in *Le Monde*, whose spikes in coverage tended to center around the dates of diplomatic events related to climate change that occurred in La Hay (1989), Rio de Janeiro (1992), Berlin (1995) and Kyoto (1997) (Brossard, et al., 2004).

U.K. political discourse concerning climate change.

Like the other studies (Brossard, et al., 2004; Trumbo, 1996), Carvalho (2005) used the number of published articles in which climate change was prominent to determine issue salience. This comparison of discursive strategies in the British media found the “quality” press in Great Britain synchronizing with the expressed views of the current prime minister toward the

greenhouse effect, the atmospheric processes believed to result in warming climate. Her results found a rising trend in press coverage from 1985-1990 under Margaret Thatcher, a quantitative recession in coverage from 1991-1996 under John Major and a second sharp rise in media attention from 1997-2000, the early years under Tony Blair.

In a qualitative analysis of the corresponding discourse, Carvalho says Thatcher changed the discourse in September 1988 from one of primarily scientific interest to a political issue and “one of the main dangers faced by humanity” (2005, p. 4). Thatcher’s speech on September 27, 1988 to the Royal Society was followed by a significant increase in the volume of coverage. Succeeding Thatcher in 1991, Major made fewer public statements on climate change, but “repeatedly aimed to capitalize on emissions reductions that were a fortuitous consequence of the replacement of coal by natural gas” (Carvalho, 2005, p. 11). After taking office in 1997, Blair’s statements were sparse, although he was cited as the author of an Op-Ed in *The Times* on December 4, 1997, “Facing up to a climate of change,” which emphasized addressing climate change as a win-win situation (Carvalho, 2005, p. 14).

Overall, “Thatcher molded much of the meaning of climate change with discursive strategies such as globalization of causation and shifting of responsibility” (Carvalho, 2005, p. 20). The similarity of Tony Blair’s statements on the subject “demonstrates that Thatcher’s views had a lasting impact” (p. 20) and “this strategy has diffused responsibility away from the state, while pre-empting and marginalizing opposition” (p. 20).

However, Carvalho (2005) found differences in coverage between the prominent newspapers. “*The Times* strongly sanctioned the Conservative governments, which *The Guardian* consistently challenged. Although mainly critical of Conservative views, *The Independent* also reinforced them at times” (p. 20). But while the views of Major and the early

views of Blair were generally reinforced by the press, after 1998 there was “a certain resurgence of critical surveillance and an oppositional discourse within *The Independent* and especially *The Guardian*” (p. 21). In addition, *The Times* became more critical after the Labour Party gained governmental control in 1997.

For the purposes of this study, the comparison between the U.S. and the U.K. was chosen because climate change as an issue seems to be less partisan in the U.K. than it is in the U.S. as demonstrated by discourse analysis comparing speeches of conservative Prime Minister Margaret Thatcher with those of Labor Party Prime Minister Tony Blair (Carvalho, 2005). Whether the U.S. media helped create this controversy, or whether it simply reflected an inherent controversy caused by government and economic factors (such as the influence of the oil and internal combustion automotive industries in the U.S.), it is presumed that the relative difference in the level of controversy should be reflected in the comparative discourse of the two nations.

Controversy and context.

Corbett and Durfee (2004) observe, “Even if someone lives through the hottest summer on record or severe forest fires (weather events that occurred in the United States in 1988 and 2002), it is the media that attempt to connect such events to scientific evidence” (p.130) [parentheses in original]. They speculate that, because media coverage plays such an important role in public understanding of science, the public understanding of climate change, along with misconceptions, has also come through the media.

In one experiment, Corbett and Durfee (2004) manipulated context and controversy—two elements found associated with public perceptions of scientific (un)certainly—in four newspaper stories. Context was added by including a paragraph of accurate scientific information that put the journal article findings within the perspective of the wider body of research. Controversy

was added by including realistic information from fabricated scientists who disagreed with the journal article's findings.

The example used was a story about the thickening of glacier ice, where the context explained that this phenomenon was an exception: most glacier ice is thinning, not thickening. They found that readers of stories that included context were more certain about climate change than those who read stories containing controversy, or those who read stories with neither context nor controversy. Without context, the story would create uncertainty, since one would not normally associate thickening of ice with climate change. The authors conclude that the inclusion of context is helpful in reducing the public's perception of uncertainty.

Research Questions and Hypotheses

The purpose of this study is to determine the degree to which major weather events have increased the volume of and served as a frame for magazine articles about climate change, and whether that tendency has been more frequent in U.S. than in U.K. coverage. To avoid difficulties with translation and availability, coverage and framing in American and British magazines were compared to see if weather events had a similar effect on climate change coverage in the U.S. and the U.K. *Time* and *The Economist* were chosen to represent U.S. and U.K. coverage, respectively. Both magazines are newsweeklies with a substantial audience within (and to some degree, outside) their respective nations. Though the demographic audiences for the two are not identical (*The Economist* readers are at a higher demographic level) there did not appear to be a more comparable U.S. weekly within the bounds of news magazines.

Techniques of discourse analysis were used to determine the extent to which social, cognitive and discourse manipulation have been used to strengthen the case one way or another.

The primary focus of this study was to determine the effect of major weather events on news media coverage about climate change, and whether that effect is comparable between the U.S. and U.K. news media. Thus, the research questions considered were:

- RQ1: Do major weather events influence news media coverage about climate change?
 - H1A: Major weather events will increase the volume of articles about climate change.
 - H1B: Major weather events will increase the volume of articles inferring a connection between the weather event and climate change.
- RQ2: Does coverage of climate change differ in the U.S. and U.K. news media?
 - H2A: The volume of U.K. articles about climate change will be less influenced by major weather events than in the U.S.
 - H2B: Major weather events will be more likely to be used as a frame for articles about climate change in the U.S. than in the U.K.

Because of the lack of political conflict in the U.K. on the climate change issue between (conservative) Thatcher and (liberal) Blair (Carvalho, 2005), this researcher predicted there will be less motivation on the part of *Economist* journalists to persuade their audience, as opposed to a publication like *Time* that is produced in the U.S. where there is perceived to be greater partisan conflict (Shapiro & Bloch-Elkon, 2005). While the media of both nations will report on political reactions to the climate change issue, because the issue is more contentious politically in America, it is predicted the U.S. media will be more likely to suggest a link to climate change when reporting current weather events such as hurricanes or droughts. U.K. journalists, on the other hand, may have the freedom to make more presumptions about the existence of climate change; thus, it is believed that U.S. journalists will be more likely to use stance words because of a greater perceived need to create context and persuade rather than simply to inform or educate their audience.

Methodology

Operational Definitions

Because news magazines such as *Time* and *The Economist* tend to focus on major news coverage, *major weather events* were defined as any event concerning the weather that is deemed worthy of coverage in either publication.

News volume was operationalized as the number of weather and climate related stories (Trumbo, 1996). *Frames* are often analyzed as a combination of both interviewed sources and article content, where sources are determined from direct quotes (Hornig, et al., 1991; Trumbo, 1996). For an article on climate change, likely sources would be scientists, politicians and interest groups (Trumbo, 1996). However, in coverage on major weather events, additional sources would include elected officials, spokespersons, victims/witnesses, as well as other non-scientist experts such as preparedness specialists, engineers and doctors (Hornig, et al., 1991). For simplicity, the frame was determined based on the headings, sub-headings and first five paragraphs of the article.

Article content was initially determined by reading the headline and lead paragraphs. If the content was determined to fall within the areas of either climate change or a major weather event, the entire article was closely read to analyze whether either the discussion of climate change is influenced by discussion of weather events, or the coverage of the weather event makes mention of climate change.

Though a frequent element in newspaper coverage, weather is not normally featured in major news magazines unless a specific storm or long-term weather change has either a short- or long-term significance. If the *article content* pertained to either weather or climate, then *weather*

event was operationalized to include any storm or weather observation covered in such articles regardless of the level of severity, the amount of casualties or the financial damage involved.

Climate change was operationalized to encompass a number of different topic areas, which included the mention of terms such as *climate change*, *CO₂* or *carbon dioxide* (in regards to the atmosphere), *greenhouse gases*, *greenhouse effect*, etc. These terms are consistent with the current dialogue about climate change, but may not be exhaustive. However, if the *article content* was determined to pertain to weather and climate, the use of such terms in that context was considered to specifically relate to the topic of climate change.

Procedure

Copies of both *Time* and *The Economist* were read over the 11-year period spanning 1996 through 2006. This 11-year span was chosen to provide a 10-year follow-up of the earlier Trumbo (1996) study, with an additional year to accommodate news media coverage of Hurricanes Katrina and Rita that occurred in late summer of 2005. Articles analyzed included news and feature articles, and not editorials, letters from readers, or anything denoted as advertising.

Print versions of both *Time* and *The Economist* were used rather than online versions. Though this was less convenient, in an online context the boundaries tend to blur between specific issues of a publication. It frequently becomes difficult to differentiate between the exact dates and issue numbers when articles were originally published. Online contextual differences also make it easier to overlook some articles that may be pertinent to the research, which in some cases may not exist online, or may require an additional charge to read.

The nature of this study was qualitative; however, a count was made to compare the quantity of articles and stance words in each publication. In addition, a count was made of sources interviewed in the article, such as government, scientist or activist. A corresponding list

was kept of names, so that patterns of frequent “go to” sources could be recognized. All of this information was accumulated in a spreadsheet.

First, the researcher counted and recorded the number of articles related either to weather or to climate, the location of the articles within the magazine, as well as the approximate length in pages in each publication for each week. Second, by reading these articles in their entirety, the researcher noted and counted stance words and sources. Third, the researcher determined whether or not the article mentioned climate change, and, if so, whether the stance words (or cited sources) infer a connection between climate change and a major weather event.

Analysis

The goal of the article analysis was two-fold. First, the research determined where the article fit into Down’s Issue-Attention Cycle (Downs, 1972; Trumbo, 1996). For example, an article that mentioned climate change within the first few months after Hurricane Katrina was deemed to fall into the alarmed discovery phase. Later stages may be more challenging to recognize. One study determined that public awareness of terrorism post-9/11 skipped the third stage of counting the cost; however, recent news concerning U.S. surveillance, including that of U.S. citizens that began following 9/11, may indicate we are only now entering that stage (Petersen, 2009).

Special attention was paid to the use of sources, such as victims, government officials, scientific and other experts, and how this varied over the course of storm coverage.

The second goal of an article analysis is to determine whether evidence of manipulation or stance exists in the language of the article (Biber & Finegan, 1988; Lipari, 1996; van Dijk, 2006; Wodak, 2006). Because the recognition of manipulation would tend to be subjective and thus difficult to quantify, the study limited its focus primarily to social manipulation, which was observed through the use of sources, such as whether comments came predominantly from

FEMA officials or a governor, or whether they included rescue workers, doctors or affected homeowners. The exception was in cases where manipulation was blatant, such as racism in stories about African Americans rioting in New Orleans.

By contrast, stance words were quantified. The words noted included those mentioned by Biber and Finegan (1988) and Lipari (1996). Each instance of these words was noted within its context (generally, a single sentence or two), as well as an interpretation of what the word might suggest regarding the writer's stance in writing the article.

Downs' issue-attention cycle.

In analyzing articles about storms, this researcher looked for evidence that the volume of articles fit into Downs' Issue-Attention Cycle, as previously discussed (Downs, 1972; Trumbo, 1996).

Manipulation and stance.

While this study includes an overall qualitative interpretation of the content regarding the presence of social, cognitive or discourse manipulation (van Dijk, 2006), it specifically quantified the use of the following subset of stance words suggested by previous discourse analysis research (Biber & Finegan, 1988; Lipari, 1996):

- *obviously, clearly, apparently, presumably;*
- *unfortunately, importantly, happily;*
- *certainly, obviously, clearly;*
- *presumably, supposedly, allegedly;*
- *might, should and ought.*

This study used the presence of such words to detect the existence of journalistic stance, but not to quantify the level of the persuasive effect of that stance. Because this is also a comparison of media from two different nations, it was assumed any implicit stance was also more obvious as it was compared to the stance of a different nation.

Concept Definitions

For this analysis, news media consisted of content from the U.K. publication *The Economist* to represent *U.K. media* coverage; content from the U.S. publication *Time* represented *U.S. media* coverage. Magazines were selected because they are published less frequently than newspapers and offer more articles with in-depth coverage. News magazine readers tend to be an elite audience, with a higher than average income, older than average median age, and are slightly more likely to be male (Pew Project for Excellence in Journalism, 2009). The American audience for *The Economist* has a significantly higher income and tends to be younger than those for the traditional U.S. news magazines, which include *Time*, *Newsweek* and *U.S. News & World Report*. Also, the readers of *Time* tended to be less wealthy and younger than the readers of *Newsweek* and *U.S. News & World Report* (Pew Project for Excellence in Journalism, 2009). However, an exact equivalent of *The Economist* does not exist in America at this time.

News media coverage was analyzed in terms of both volume and framing, which showed the importance each publication put on the issue of climate change as well as the approach that media used to convey the issue.

Because coverage of climate change has been in the news off and on for many decades, this study limited itself to the period immediately after the completion of the Trumbo (1996) study. Since the Trumbo study went from 1985 to 1995, the time frame for this analysis began in 1996 and proceeded through 2006, which captured much of the coverage of climate change which resulted from Hurricanes Katrina and Rita, as well as some major weather events in Europe.

An attempt was made to place climate change coverage within Downs' issue-attention cycle (Downs, 1972) both for U.S. and U.K. coverage, to determine whether U.K. coverage, unlike that of France (Brossard, et al., 2004), might conform to that cycle, as well as to verify

whether U.S. media is continuing to follow the cycle. Both *The Economist* and *Time* are weekly publications. Because major weather events, like climate change articles, do not occur on a specified schedule, each magazine throughout the 11-year span from 1996 through 2006 was scanned to determine whether articles covered either or both topics. Note that the time period was expanded from the more typical 10-year span to allow consideration of ongoing news coverage of Hurricane Katrina, which occurred in the late summer of 2005. The headlines and first five paragraphs of all articles were scanned, excluding opinion pieces, advertising and letters to the editor. Articles that met the aforementioned criteria were read more closely to analyze the framing and the use of stance words.

Results

Weather- and Climate-Related Articles

As discussed previously, there are numerous differences in the political climate between the U.S. and U.K. However, there are also differences in the climate itself in the two nations. Because of its location, and favorable Atlantic Ocean currents from the equator, Great Britain enjoys moderate weather changes throughout the year. This became evident during the 11-year course of this study, as only one article described inclement weather in the U.K., in the form of unusually heavy rain.

By contrast, the U.S. comprises a much larger landmass, and is situated such that it experiences dramatic variations in weather, in part as a result of fluctuations in El Niño. And this is without considering the potential impact of climate change.

In England, weather means you need to carry an umbrella; in America, it means you may need to evacuate.

Comparison of article count.

The disparity in climate between the U.S. and U.K. seemed to influence both the frequency and the stance of weather reporting in *Time*. As can be seen in Figure 1, the difference in the number of articles is usually small, mitigated by the fact that, while *Time*'s coverage focused primarily on North American weather, and especially the U.S., *The Economist* was more likely to cover severe weather throughout the world. The biggest disparities between the two appear in 1997 when *The Economist* carried more coverage on climate change and the Kyoto climate conference, in 2000 when *The Economist* covered several severe storms throughout the world (including forest fires in the southwestern U.S.) along with more coverage on climate change, and in 2005, when *Time* had slightly more coverage of Hurricane Katrina and Rita.

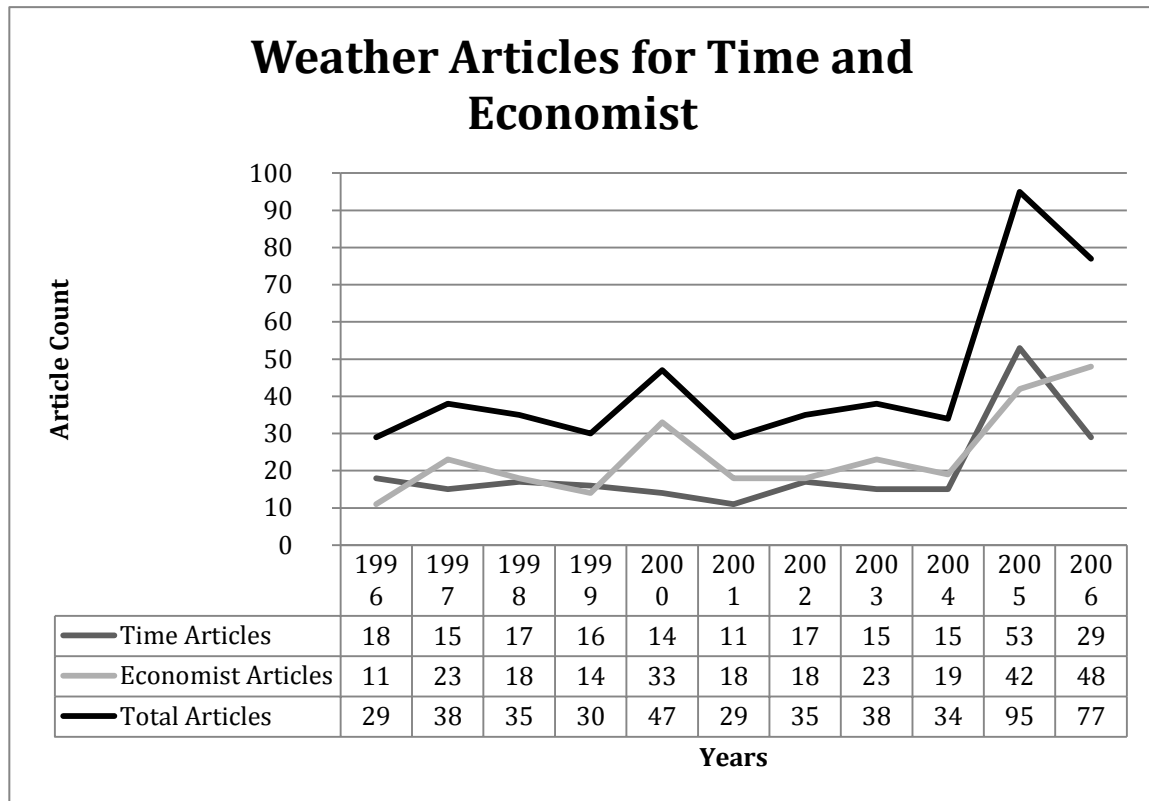


Figure 1: Weather Articles for Time and Economist

Comparison of page count.

The biggest difference between the two magazines was in page count, as shown in Figure 2, with *Time* significantly higher, especially as a result of 2005 Hurricane Katrina coverage. However, this difference is largely due to stylistic differences between the two publications, with *The Economist* favoring shorter articles with fewer and smaller illustrations and *Time* often using full-page spreads of photography and graphics. For the purpose of this study, a word count might have better illustrated the relative weight of articles between the two publications.

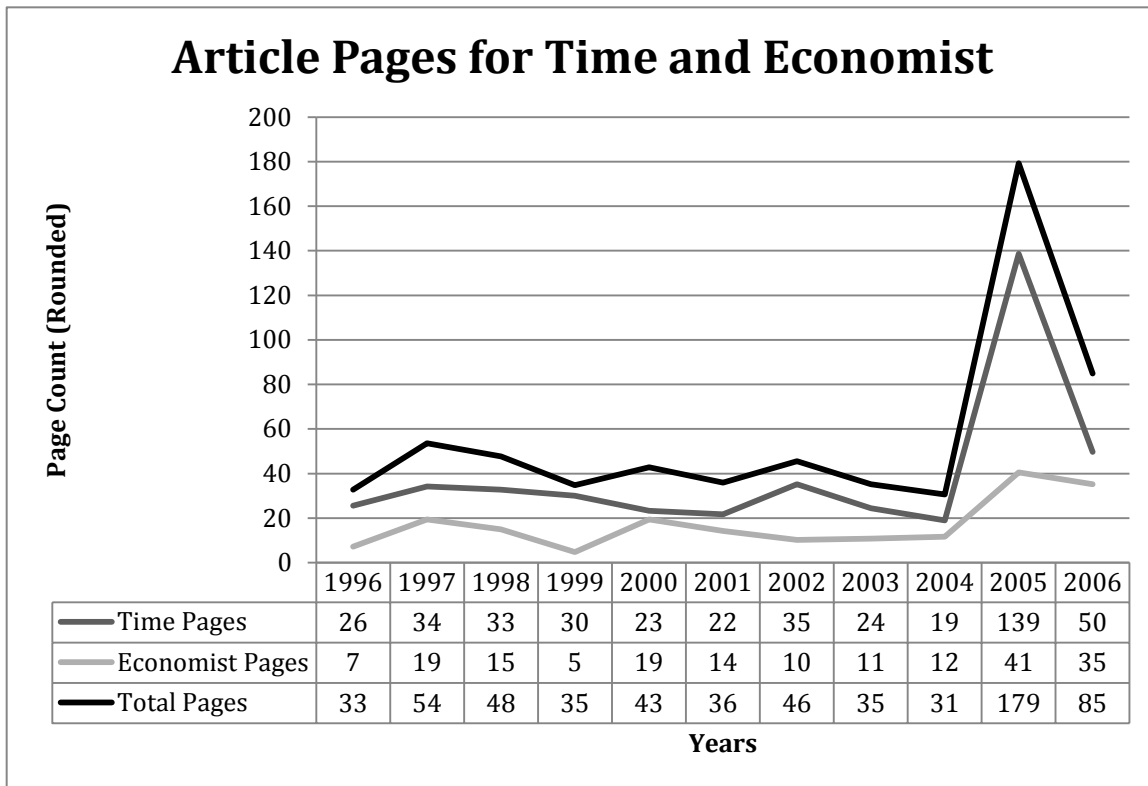


Figure 2: Article Pages for Time and Economist

Stance

Initially, stance did not seem to be a cause of concern in this study. This may be because many of the articles appeared in the Science sections of the magazines, and the accepted style for science writing is more neutral and evidence-based, with perhaps a lower tolerance for adverbials. It could also be a reflection of editorial standards for the two magazines.

Indeed, the difficulty of finding *any* stance words whatsoever (aside from *unfortunately*) led the researcher to revisit the literature, and to expand the list of terms to look for. Thus, in addition to the stance words previously mentioned, the following *bolded* words from Biber and Finegan (1988) were counted:

- *obviously, clearly, apparently, presumably, **maybe, perhaps;***
- *unfortunately, importantly, happily, **fortunately, ironically, naturally;***
- *certainly, obviously, clearly;*
- *presumably, supposedly, allegedly;*

- *might, should, ought;*
- *unquestionably, of course, no doubt;*
- *in fact, really, as a matter of fact, actually.*

The last several words, known as *actually* words, appeared most often, especially *really* and *in fact*. This stands to reason as a journalist who feels a great deal of pressure to convince others that a phenomenon such as climate change is real might unconsciously include words that emphasize that. *Of course* and *certainly* also tended to be common, as they may have suggested a subtle (if unscientific) implication of certainty. The popularity of *unfortunately* seemed an affectation of *The Economist*; however, it may also serve to reinforce the negative implications of the article topic. The frequency of stance words found is shown in Figure 3. Words not listed did not occur in articles studied.

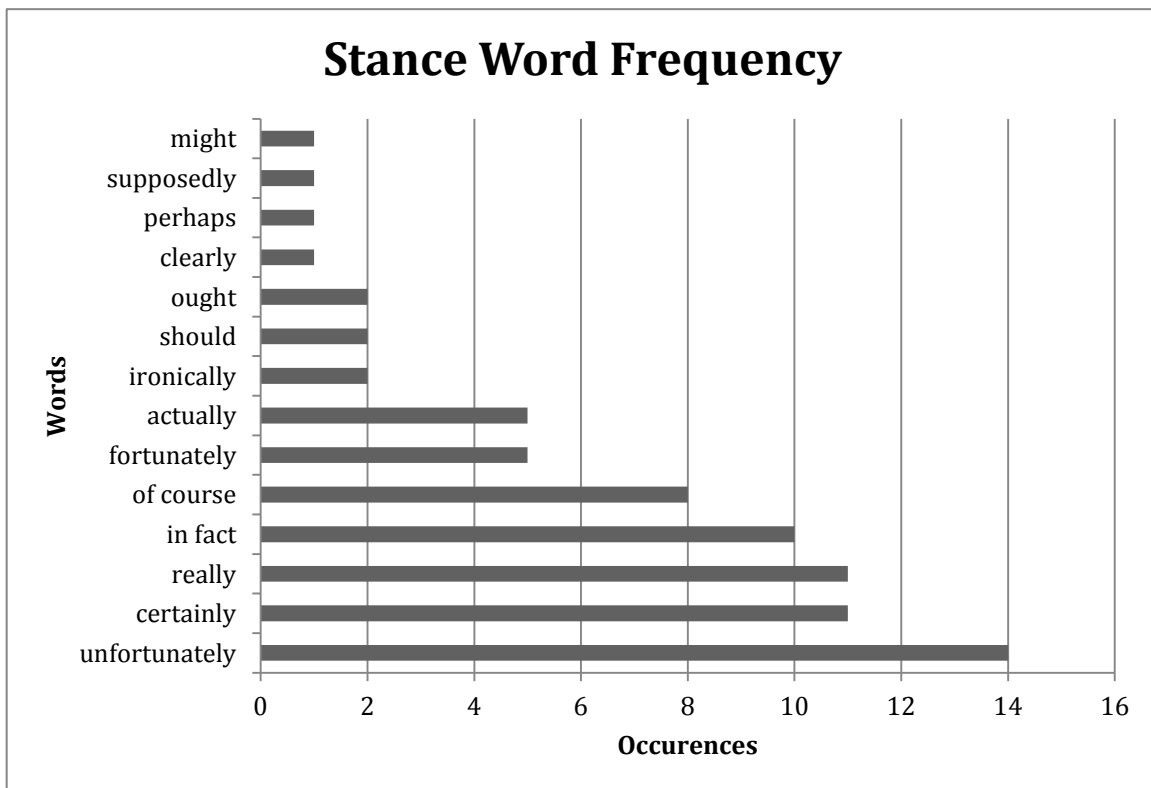


Figure 3: Stance Word Frequency

As can be seen from Figure 4, there was almost an echo effect in the use of stance words between the two magazines. For example, a 1997 uptick in stance in *The Economist* predated a parallel increase in *Time* in 1998, with much of the stance-laden coverage in both publications centered on El Niño. There were also more stance words in *Time* following the Kyoto conference in December 1997, along with (accurate) predictions that Congress would not approve the climate protocol.

The use of stance words in climate change articles in both magazines increased during the 2000 U.S. election campaign between Bush and Gore, perhaps driven by Gore's association with the issue, but the stance words in *Time* increased still more after Bush won the election and shortly thereafter proclaimed climate change off the table as an issue. The two magazines were close together in stance in 2003, with all of the stance words in *Time* occurring in an article about the Arctic ice melting, while *The Economist's* use of stance was distributed among several weather and climate topics.

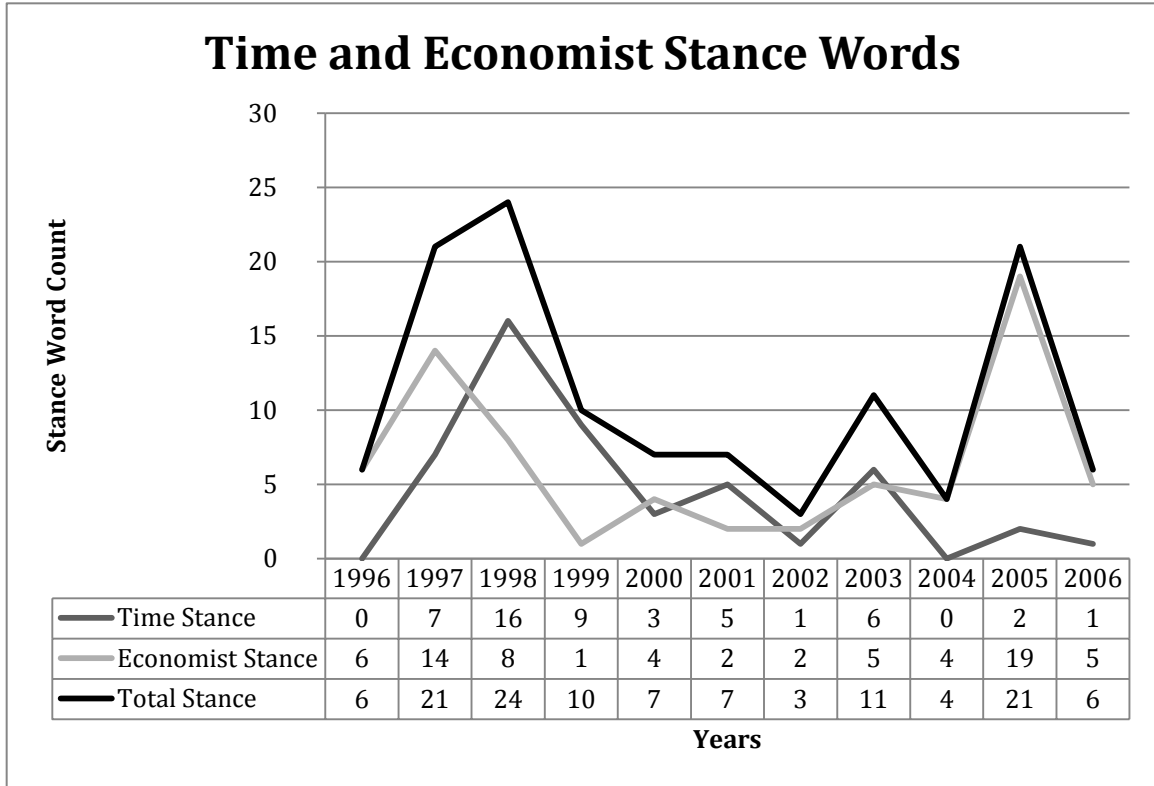


Figure 4: Time and Economist Stance Words

In general, an increase in stance words for *The Economist* coincided with international events—note especially the 2005 spike following Hurricane Katrina. It is interesting to note *Time’s* use of stance words actually declined during 2005, perhaps because its greater use of photography to reveal the devastation following Hurricane Katrina made such emphasis less necessary, though perhaps also because, four years after 9/11, it was still difficult for the American media to challenge the U.S. government response to the disaster (as *The Economist* did).

Even with the broader scope of stance words, the number of articles with more than one or two stance words was minimal, with *The Economist* slightly less apt to use them. The articles that contained several stance words often came across as more biased and even alarmist in tone.

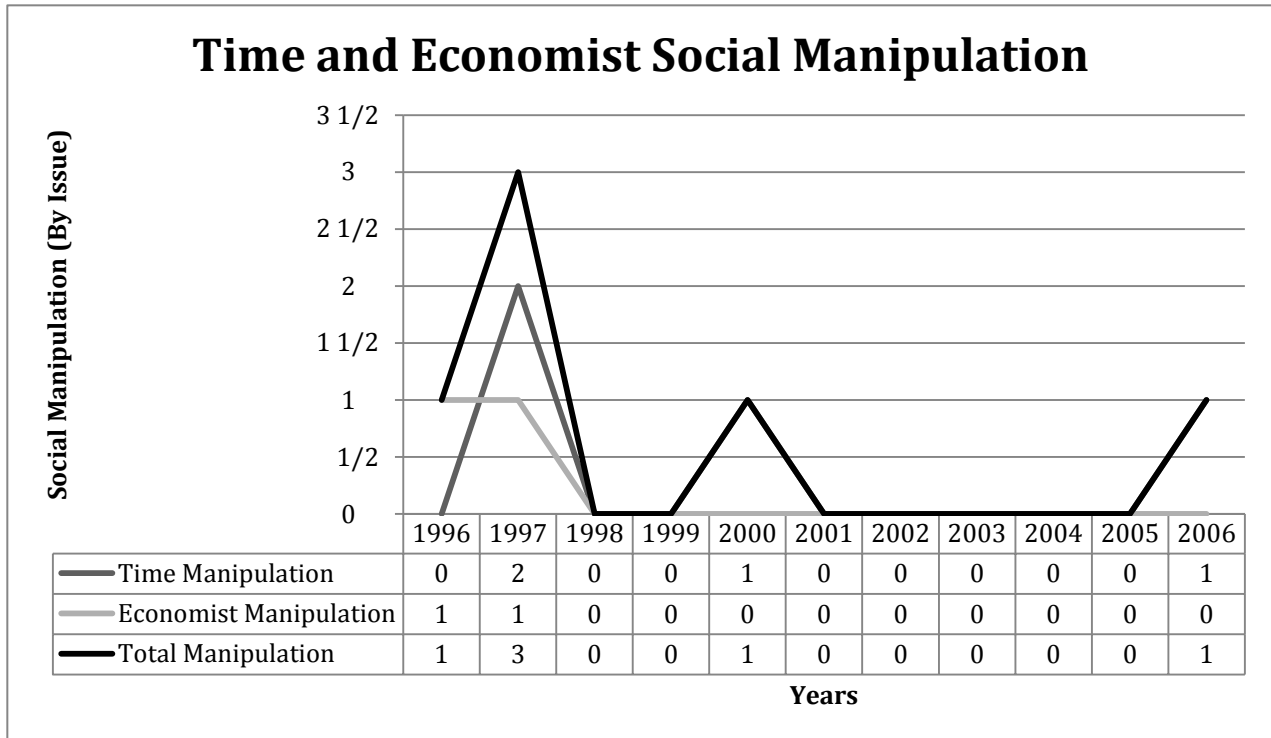


Figure 5: Time and Economist Social Manipulation

Van Dijk (2006) stated that social manipulation occurs through the power structures in society. As can be seen in Figure 5, social manipulation was mostly non-existent. This is perhaps because neither medium appeared to be promoting the status quo. What little manipulation there was occurred early on and was admittedly subjective at that, as the researcher included alarmism or put downs of other nations in this category. It is possible this early manipulation could mark the “alarmed discovery” period of the Downs’ Issue Attention Cycle, particularly on the part of *Time*, as it occurred around the time of the Kyoto conference.

Climate Change Articles

In general, the number of magazine issues that addressed climate change increased over time, as indicated by Figure 6. However, the numbers reflect the number of *magazine issues* addressing climate change, rather than the actual number of *articles* addressing climate change; in essence, it was a yes/no rather than a counter. This is because the researcher assumed a

magazine might have several weather-related articles, but only one of which mentioned climate change. While this was often true for *The Economist*, it was not true for *Time*, which during the early 2000s increasingly dedicated entire issues to the topic of climate change. Had individual articles been counted, it is likely the slope for *Time* would be much steeper.

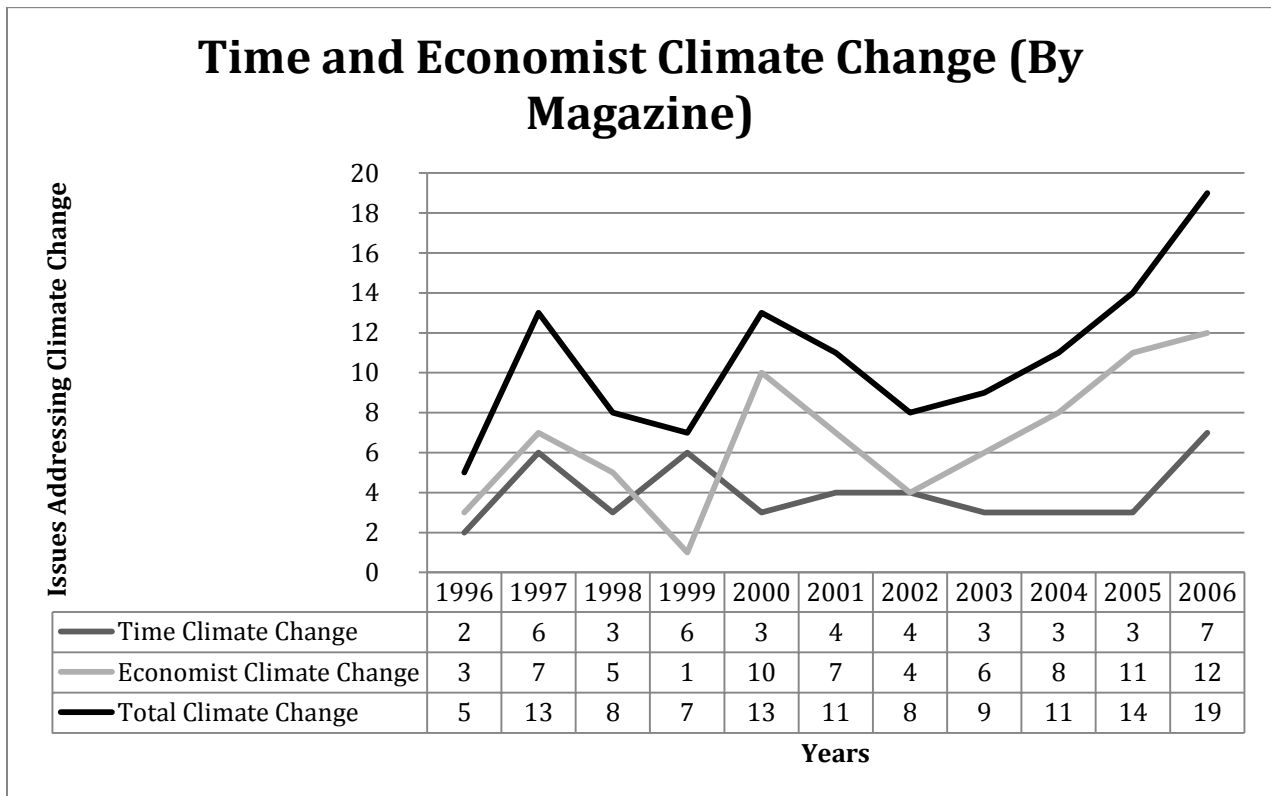


Figure 6: Time and Economist Climate Change (By Magazine)

Climate Change Inferences

Inferences of a connection between a specific storm and climate change were relatively rare; indeed articles often contained “negative inferences” pointing out that it was unscientific to make a connection on the basis of a single storm. Occasionally such negative inferences were qualified, though, with the article saying in effect: “It would be premature to conclude this storm was caused by climate change, but...” To the extent this approach seemed to be leading the

reader, articles that took this approach were also included as inferring a connection between the storm and climate change.

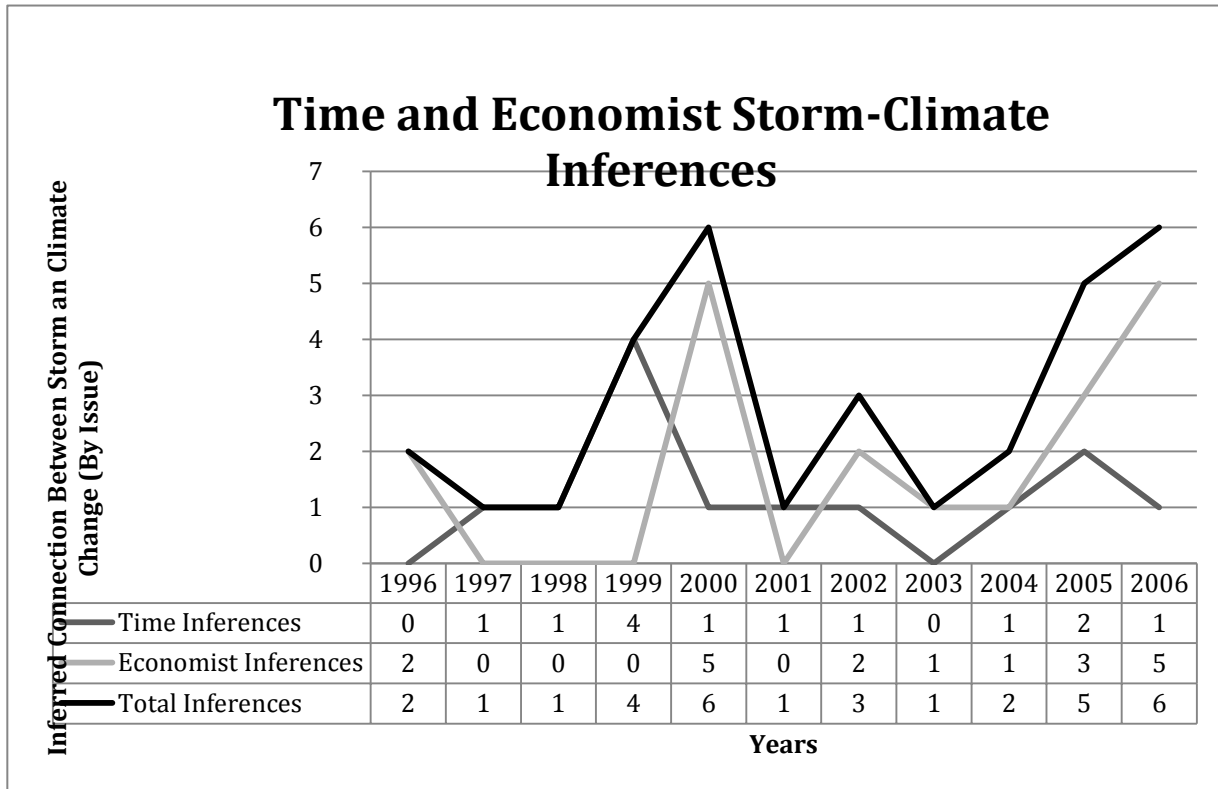


Figure 7: Time and Economist Storm-Climate Inferences

As predicted, severe hurricanes, tornadoes or forest fires often appeared to drive climate change inferences. However, inferences shown in Figure 7 were equally likely to be influenced by political events such as climate or sustainability conferences, George W. Bush’s refusal to address climate change, or by movies such as *The Day After Tomorrow* or *An Inconvenient Truth*.

Discussion

Research Questions

RQ1: Do major weather events influence news media coverage about climate change?

Downs' issue-attention cycle.

It was difficult to determine what influenced editorial decisions in terms of when to provide coverage of climate change. It may be that editors determined the topic had not been addressed recently; thus, if nothing else trumped it in relevance, the current edition was an appropriate place to address it. In particular, when an entire issue was dedicated to the subject, as occurred with increasing frequency especially with *Time*, it is unlikely that it was a spur-of-the-moment decision, but instead planned several months in advance.

One thing that became clear over the course of this study was that weather was only one factor that brought up the subject of climate change. In the U.S. as well as the U.K. media, political events—both national and international—were just as likely to have an influence. This did not negate the premise of Downs' Issue-Attention Cycle, which does not specify the type of event that might influence the amount of coverage. However, it was interesting in view of previous studies to note that international politics related to climate change seemed to influence U.S. reporting to about the same degree as it did in the U.K., in spite of (or because of) presidential and congressional opposition.

While an apparent alarmed discovery stage may have occurred at around the time of the Kyoto Accord, the “cyclic” element of Downs' was otherwise not evident. Indeed, the overall frequency of climate change reporting increased over the period of the study, without any obvious decline. This may be in part because industry had already “counted the cost” (Stage 3) of climate change remediation, and rather than pay that cost, attempted to proactively dispense

with the issue altogether. This may have had the unintended consequence of making the media more tenacious in its pursuit of the issue. In addition, the need to create context, as well as to decrease the perception of controversy, would logically increase the volume and frequency of climate change coverage, as providing context generally requires a higher word count than the “sound bite” necessary to create conflict.

Again, this does not necessarily challenge the theoretical basis, as Downs’ does not stipulate the *length* of the cycle. However, unless a much more serious issue comes along—and within the constraints of not boring readers or offending advertisers—it seems unlikely the coverage of climate change will significantly decline in the foreseeable future.

Inferences versus stance.

For the most part, inferences that a specific storm was the result of climate change were relatively few. Most articles correctly stated the scientific view that any one storm does not imply a change in climate with any certainty. Nor were these inferences necessarily driven by reporting of storms, droughts or forest fires, but were just as likely to be associated with political statements or events.

Instead of weather-climate causal inferences, the use of stance words—specifically those from the more prevalently used *actually* category—may have subtly mitigated any perception on the part of the reader that the science was uncertain. Though stance words were not used to an excessive degree, or in every article, the specific selection of words seemed intended to emphasize the certainty and negative outcomes of climate change.

H1A: Major weather events will increase the volume of articles about climate change.

Research partially supported H1A, as there was a clear increase during the span of the study in both magazines in the frequency of climate change reporting, which often coincided

with severe weather events. However, politics—both national and international—were also clearly a factor, with an uptick in reporting after the initial Kyoto conference, during the 2000 Election in which Al Gore was a candidate, and especially after George W. Bush, shortly after taking office, made dismissive comments about the importance of controlling CO₂ emissions. Thus, even as *Time's* coverage of weather events became more succinct after 9/11 and the subsequent wars in Afghanistan in Iraq, its coverage of climate change—generally timed to coincide with the Earth Day celebration—became more exhaustive. Indeed, the April 9, 2001 15-page cover story on climate change, occurring two months after President Bush's dismissal of climate change, won an Overseas Press Club award for best reporting on the environment. Though the timing of coverage differed from *Time's*, a similar pattern occurred in *The Economist*.

H1B: Major weather events will increase the volume of articles inferring a connection between the weather event and climate change.

H1B was not supported, as both newsmagazines took care to avoid such inferences. Here, too, politics was as much an influence as weather events themselves.

RQ2: Does coverage of climate change differ in the U.S. and U.K. news media?

Framing.

The disparity in the frequency and severity of weather events between the U.S. and U.K. may have influenced an apparent difference in conceptualization—and, therefore, framing—between the two publications in weather coverage. *The Economist*, as its name implies, tended to focus on fiscal implications of weather events. While this occasionally led to the impression of distance and lack of empathy, the publication mitigated this economic emphasis, addressing particularly devastating weather events with follow-up stories focusing on the event's long-term impact on the poor, and a harsh judgment of any governments that were not perceived as

responding in an expedient fashion. This judgment became clear in two stories reported in 2005, one on India's response following flooding in Mumbai (After the deluge, 2005), and the following editorial immediately following Hurricane Katrina:

Since Hurricane Katrina, the world's view of America has changed. The disaster has exposed some shocking truths about the place: the bitterness of its sharp racial divide, the abandonment of the dispossessed, the weakness of critical infrastructure. But the most astonishing and most shaming revelation has been of its government's failure to bring succour to its people at their time of greatest need. *The Economist*, Sept. 10, 2005 (The shaming of America, 2005)

If Britain's own lack of severe weather events made it easier for *The Economist* to pass judgment on other nations for responding to storms inadequately, the more frequent severe weather in the U.S. appeared to have an inoculating effect. Thus, prior to 9/11, there was a tendency for *Time* to use a "risk-taking" or "epic storm" frame in weather reporting, whether it entailed an article on storm-chasing following the movie *Twister* (Nash, 1996) or of a team of climbers caught on Mt. Everest during a blizzard (Kluger, 1997; Van Biema & Colmey, 1996). The nadir of this approach—though it appears to be an exception—came in the reporting of Hurricane Floyd, which slowed down significantly before landfall following a massive evacuation of the Southeast. The reporting included three articles, none of which interviewed actual victims of the storm, and one of which interviewed affluent property owners in the Florida Keys who were not impacted by Floyd but were willing to take the risk of future hurricanes in order to live there (Lemonick, Liston, August, Matthieussent, & Roche, 1999). *Time's* coverage resulted in the following letter to the editor from a reader in Durham, North Carolina. Though reader letters were not part of the study, this one expresses the problem with minimizing the gravity of any specific storm:

I was dumbfounded by the ignorance and insensitivity you displayed in the article on Hurricane Floyd [NATION, Sept. 27]. Using phrases like "a very close call" and referring to the storm as "a sheep on steroids" showed complete disregard for the incredible suffering that still continues as I write this letter. Thousands of

families have lost everything they owned. These are not rich retirees on the coast; these are simple, hardworking, God-fearing people who do not have the resources to rebound. How utterly thoughtless and inhuman of you—real hearts of stone (Charles, 1999).

Time's risk-taking frame may have been an attempt to appeal to a younger demographic.

More disturbingly, it may have been a reflection of an element in American culture, one that disregards the impact of a storm on the less affluent as easily as it disregards the long-term implications of climate change.

In any case, this risk-taking aspect of weather coverage in *Time* appeared to decline after 9/11, along with less reporting of severe storms in general. In some cases, a satellite photo was deemed an adequate representation of a hurricane. Perhaps this was in part the result of budget cuts, as well as the demand for resources necessary to cover a war on terror in two fronts. Then, too, the war on terror may have quenched the desire for stories on risk-taking in general.

It did not however, appear to reduce the coverage of forest fires, which both *Time* and *The Economist* addressed at length, and in particular the discussion of the impact of past forest management decisions such as thinning forests and letting forest fires burn.

There were also some differences between the two magazines on climate change coverage. Though the researcher found little of the “He said, she said,” balanced reporting that has been found to be problematic in reporting on climate change, with one or two exceptions, there almost seemed to be an avoidance of conflict in *Time* altogether. *The Economist*, on the other hand, seemed willing to cover alternate views on climate change, but equally willing to present a counter argument and dispatch them as false. This latter approach may have been effective, in part, because it did not allow for a vacuum to develop in which alternative media might impose their views, or worse, claim their viewpoint was being censored by the mainstream. This approach might be considered “advocacy” in the U.S. media.

The researcher observed that the framing of newsmagazine articles is somewhat different than that in newspapers. Because a weekly comprises a summary of events, rather than the immediate coverage, a greater tolerance may exist for commentary as to the implications of those events. Indeed, it was occasionally difficult to distinguish between the two. There was also a greater editorial emphasis in weeklies on not simply rehashing what happened, but in giving it greater meaning and context. This might include implications as to whether a particular storm was indicative of climate change, or whether it appeared to be part of a larger pattern. Magazines researched also included articles on business implications for severe storms, such as to the reinsurance industry, which provides a hedge to traditional insurance companies in the event of a catastrophic event, and to car manufacturers who may perceive a greater market for “green” products, approaches that were used in both magazines.

Downs’ Issue-Attention Cycle.

One thing that became immediately obvious at the beginning of the time period is the two periodicals appeared to be at different stages of Down’s Issue-Attention cycle. This may reflect political differences that have already been discussed, with the British government having accepted the importance of climate change under Margaret Thatcher and the U.S. having an influential demographic that still questions its existence. In any case, *Time* appeared in the late 1990s to be in the second, or alarmed discovery phase (though the issue of climate change is not new to the scientific world or the news media in America), while *The Economist* appeared to be in phase three, counting the cost.

What this means is while *Time* seemed determined to convince its audience that climate change exists and must be dealt with *immediately*, *The Economist* was apt to take a more measured and conservative approach, often dismissing the alarmist views of “greens” or even of Al Gore, who they believed made his solutions sound overly easy in order to make them more

politically palatable. *The Economist's* editorial view was that moderate change had more appeal to business and often recommended an economic approach to climate change, even expressing support for some of the American free-market proposals at Kyoto, like an emissions exchange for CO₂ (similar to the “cap and trade” already used for other emissions). On the other hand, there appeared to be a view that regulation of industry might actually benefit industry, creating both an incentive and a level playing field for those corporations that chose to modernize.

Time, on the other hand, was more likely to recommend technological solutions, such as greener sources of energy, more energy-efficient vehicles and new cattle feeds to reduce methane.

After George W. Bush took office, there was evidence that *Time* also transitioned into the third phase of Downs' Issue-Attention Cycle, though, given the negative views in Congress toward Kyoto, it is not clear climate change would have been less of a challenge had the election turned out differently. This might be seen as a sign of declining interest; however, in America, where both sides often treat environmentalism as a zero-sum game, it could have positive consequences, as long as concerns about the economy and deficit do not drive it out of the discussion entirely.

Sources.

A diversity of sources was used in articles, including government, survivors, scientists, business sources and special interests. As expected, government sources tended to dominate storm coverage. However, there was no shortage of scientists, especially in articles focused on the topic of climate change. The researcher observed some repetition of scientific sources. For example, NASA climatologist James Hansen, who is widely known for his U.S. government testimony regarding climate change, was quoted more than once. Others included those who had done specific areas of research, such as William Gray from Colorado State University, Roger

Pielke, Sr., who was associated with both Colorado State University and the National Center for Atmospheric Research (NCAR), and Christopher Landsea from the National Oceanic and Atmospheric Administration (NOAA). Though atmospheric scientists and climatologists dominated climate change coverage, there was also an apparent effort to bring in different branches of science, such as oceanographic and tree ring studies, in order to show corroborating evidence for climate change from different branches of science. Likewise, ecologists and forestry experts were interviewed for articles regarding drought and forest fires in the western U.S.

H2A: The volume of U.K. articles about climate change will be less influenced by major weather events than in the U.S.

H2A was not supported as neither publication seemed more inclined to cover climate change in response to weather events. To the extent *Time* had more coverage, it may have largely been due to a disproportionately high number of such events occurring in North America; however, *The Economist* often covered the same events.

H2B: Major weather events will be more likely to be used as a frame for articles about climate change in the U.S. than in the U.K.

As mentioned previously, there were differences in article framing between the two magazines, but these were not driven so much by weather events as by other factors. Both *Time* and *The Economist* mentioned the potential influence of climate change on increasing the severity of weather events, although both were careful to stipulate that climate change could not be given as the cause of a specific weather event, but only could be observed as influencing an overall trend. In the earliest years of this study's time frame, the two magazines were somewhat more apt to attribute a storm or drought to El Niño or La Niña. Other cyclic activities, like various oscillations in ocean temperatures, tended to come up later. It was during the coverage of Hurricane Katrina that the two magazines came closest to ascribing an increase in severe hurricanes to long-term climate change rather than to cyclic weather patterns. However, Katrina

coverage was quickly consumed in articles about government incompetence, and climate change was temporarily forgotten.

In terms of framing, long term changes, such as ice melting in the Arctic, or rising ocean depths and warm water bleaching of coral in the Maldives were more likely to be linked to climate change, as they were less easily dismissed as a cyclical aberration. Thus, there was not strong support for H2B.

Conclusion

This study found that media coverage of both severe weather events and climate change increased during the 11-year period of this study, especially when such events were not trumped by more immediate issues like 9/11 and the wars in Afghanistan and Iraq. The coverage of climate change, in particular, increased over the course of the timeframe of study.

However, the discourse analysis of *Time* and *The Economist* does not suggest the coverage of climate change was driven by severe weather-related events, such as hurricanes, tornadoes, droughts and forest fires. The more likely influence in both magazines appears to be the growing awareness that political views in Washington, D.C. are inconsistent with those in the rest of the world.

The study neither supported nor negated the Downs' Issue-Attention Cycle model of environmental coverage, as the coverage period saw an increase of coverage of both weather and climate, but no accompanying decrease, though perhaps a future study would observe a measurable decline in coverage. However, based on the results of this study it seems likely the climate change issue will continue to receive coverage for the immediate future.

Weather and climate coverage was sometimes accompanied by the use of stance words that may have subtly implied a higher degree of certainty about climate change than the scientific evidence supported, a discursive approach perhaps driven by a perceived need to counter climate-change denials.

Limitations

Due to library budget cuts, weather-related flooding at the library and other miscellaneous occurrences, several issues of the two newsmagazines were missing. This made it necessary for the researcher to use online versions of those magazines. Though this may have influenced the accuracy of some results, there were also advantages to this approach. The sequence of article presentation in the magazines was usually consistent with the print edition (albeit with the inclusion of some U.K.-only articles online). Though the text-only format meant there were no illustrations or advertising, there were page and word counts for each article, as well as abstracts, which compensated for most deficiencies.

The different styles of *The Economist* and *Time* made the use of page counts somewhat misleading in determining the relative weight of articles between the two publications. In a future study using online resources, a word count might be preferable.

In this study, social manipulation, climate change coverage and climate-weather inferences were measured as a yes or no value by issue. Though this did not appear to influence results for social manipulation and climate-weather influences, it did tend to underreport the number of articles mentioning climate change, as some entire magazine issues were dedicated to the topic and thus contained multiple articles.

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Appendix I: References for Analyzed Articles

The following sources met one or more of the research criteria for stance words, social manipulation or weather-climate change inferences.

5 years ago in Time. (2005 12-September). *Time*, p. 26.

A calamity waiting to happen. (2005 12-September). *Time*, p. 78-79.

A city silenced. (2005 3-September). *The Economist*, p. 11.

A coat of green. (2006 9-September). *The Economist*, p. 19-20.

A cooling off period. (1997 29-November). *The Economist*, p. 83-85.

Adams, M. (2006 3-April). Vicious cycles. *Time*, p. 38-39.

Africa with no rain, or too much. (1997 13-December). *The Economist*, p. 39.

After the deluge. (2000 11-March). *The Economist*, p. 52.

After the deluge, moi? (2002 24-August). *The Economist*, p. 39-40.

After the flood. (2005 3-September). *The Economist*, p. 27-31.

After the storm, the cleaning up. (1998 17-January). *The Economist*, p. 32.

A good soaking. (2004 23-October). *The Economist*, p. 80.

A hard rain. (2000 4-November). *The Economist*, p. 61-62.

A lean, clean electric machine. (2005 10-December). *The Economist*, p. 77-79.

Alexander, C. (2006 3-April). Rewarding good behavior. *Time*, p. 57.

Alexander, C. (2006 3-April). The climate crusaders. *Time*, p. 52-56.

A log in the wind. (1997 19-July). *The Economist*, p. 71.

An act of God. (1997 19-July). *The Economist*, p. 69-71.

A not so rainy day. (2000 11-March). *The Economist*, p. 86.

Anti-hero. (2006 9-September). *The Economist*, p. 18.

A vicious cycle. (2005 3-October). *Time*, p. 44-45.

A warm reception. (2001 16-June). *The Economist*, p. 10.

Awful weather we're having. (2004 2-October). *The Economist*, p. 74.

Bjerklie, D., & Cray, D. (2006 3-April). Feeling the heat. *Time*, p. 36-37.

Blowing hot and cold. (2002 6-July). *The Economist*, p. 9-11.

Blowing smoke. (2002 16=February). *The Economist*, p. 27-28.

Bradford, L., & Dorfman, A. (2002 26-August). The state of the planet. *Time*, p. A15, 3p.

Branegan, J., & Thompson, D. (1999 26-April). Is Al Gore a hero or a traitor? *Time*, p. 66 2p.

Bringing back the barley. (2006 9-September). *The Economist*, p. 8.

Burning to build. (2005 27-August). *The Economist*, p 42-43.

By flood and by fire. (1997 26-April). *The Economist*, p. 24.

Changing science. (2005 10-December). *The Economist*, p. 89-90.

Changing the climate of opinion. (2000 1-August). *The Economist*, p. 59.

Chaos on the coast and on the Hill. (2005 1-October). *The Economist*, p. 32.

Chu, J., & Loebis, Z. (2005 12-September). Here's what you do. *Time*, p.85.

Cleaning up. (2005 6-May). *The Economist*, p.75.

Cooper, M. (2005 12-September). Dipping his toe into disaster. *Time*, p. 51.

Dam floods. (1996 27-July). *The Economist*, p. 30.

Dell, K. (2005 12-September). New Orleans under water. *Time*, p. 62-63.

Desiccation row. (2002 29-June). *The Economist*, p. 29.

Dismal calculations. (2006 9-September). *The Economist*, p. 14-17.

Doing it their way. (2006 9-September). *The Economist*, p. 22-23.

Don't despair. (2005 10-December). *The Economist*, p. 11-12.

El Niño goes into politics. (1997 22-November). *The Economist*, p. 38.

Environmental enemy No. 1. (2002 6-July). *The Economist*, p. 11.

Eye on the storm. (2000 26-February). *The Economist*, p. 91-93.

Farming after the hurricane. (1999 20-February). *The Economist*, p. 35-36.

Feeling the heat. (2001 9-April). *Time*, p. 22, 2p.

Fire and ice. (1996 19-October). *The Economist*, p. 85.

Flavin, C. (1997 15 December). Clean as a breeze. *Time*, p. 60, 3p.

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