

Rowan University

Rowan Digital Works

Theses and Dissertations

10-28-2008

Scientific consensus on manmade global warming: think tank influence on public opinion through news media

Greg Howe
Rowan University

Follow this and additional works at: <https://rdw.rowan.edu/etd>



Part of the [Public Relations and Advertising Commons](#)

Recommended Citation

Howe, Greg, "Scientific consensus on manmade global warming: think tank influence on public opinion through news media" (2008). *Theses and Dissertations*. 695.
<https://rdw.rowan.edu/etd/695>

This Thesis is brought to you for free and open access by Rowan Digital Works. It has been accepted for inclusion in Theses and Dissertations by an authorized administrator of Rowan Digital Works. For more information, please contact graduateresearch@rowan.edu.

SCIENTIFIC CONSENSUS ON MANMADE GLOBAL WARMING: THINK TANK
INFLUENCE ON PUBLIC OPINION THROUGH NEWS MEDIA

by

Greg Howe

A THESIS

Submitted in partial fulfillment of the requirements of the Master of Arts Degree
of
The Graduate School
at
Rowan University
October 28, 2008

Approved by _____ *10/28/08* _____

Date approved

© 2008 Greg Howe

ABSTRACT

Greg Howe
Scientific Consensus on Manmade Global Warming: Think Tank Influence on Public
Opinion through News Media
2008
Advisor: Joseph Basso, J.D., Ph. D., APR
Public Relations Graduate Program

This study examined the influence of think tanks, in the news media, on public opinion of what most scientists believe about the cause of global warming.

The researcher performed a content analysis on two national newspapers spanning May through July, 2006, the three months surrounding the U.S. release of *An Inconvenient Truth*, to determine whether papers of differing political ideology provided different amounts of context concerning the global warming scientific consensus. The data were tabulated using Microsoft Excel. Experimental research was also conducted using 103 undergraduate Rowan University public relations and public relations and advertising majors to determine if articles with less context caused confusion in subjects regarding their perception of the scientific consensus on manmade global warming.

The findings showed that think tanks were used as experts only sparingly. However, articles claiming that global warming is a natural phenomenon were found to provide less context than articles claiming that global warming is manmade. The experimental research showed that subjects were most uncertain about global warming after reading an article with very little context.

MINI-ABSTRACT

Greg Howe

Scientific Consensus on Manmade Global Warming: Think Tank Influence on Public
Opinion through News Media
2008

Advisor: Joseph Basso, J.D., Ph. D., APR
Public Relations Graduate Program

This study examined the influence of think tanks, in the news media, on public opinion of what most scientists believe about the cause of global warming.

The researcher performed a content analysis to gather information on amounts of context provided on the scientific consensus on manmade global warming in two newspapers of differing political ideology. Experimental research was also conducted to determine the affects of context on understanding of the consensus.

The findings showed that the newspaper favoring the scientific consensus on manmade global warming contained more context than the newspaper opposing it. The experimental research showed that subjects receiving more context were more certain about a scientific consensus on global warming than those receiving little context.

Table of Contents

List of Figures	v
CHAPTER	PAGE
I. Introduction	1
Statement of the Problem	3
Purpose of the Study	4
Definition of Terms	5
Hypotheses and Research Questions	7
The Assumptions	8
The Limitations	9
Significance of the Study	9
II. Review of the Literature	10
Global Warming	
Explanation and Early Research	10
Development of a Scientific Consensus	13
Public Perceptions	
Existence of Global Warming	18
Scientific Consensus on Existence of Global Warming	18
Existence of Manmade Global Warming	19
Scientific Uncertainty & the Media	
Science Communication	19
Climate System Dynamics	20
Journalistic Objectivity	20

	Context	21
	Journalist Ignorance	22
	Journalists' Power to Validate	22
	Framing	23
	Two-Step Flow Theory of Media Effects	24
	The Claimsmakers	
	Issues Management	25
	Carbon Industry	27
	Think Tanks	31
	Tactics	32
	Manipulation	35
	Think Tanks in Context	35
III.	Research Design	37
	Instruments	
	Content Analysis	37
	Experimental Research	39
	Procedures	
	Content Analysis	40
	Experimental Research	41
	Data Analysis	42
IV.	Results	43
	Content Analysis	43
	Experimental Research	47

V.	Interpretation and Suggestions	54
	Evaluation	54
	Interpretation	54
	Content Analysis	54
	Experimental Research	60
	Conclusions	63
	Contribution to the Field	64
	Further Research	65
	REFERENCES	67
	APPENDICES	
	Appendix A: Content Analysis – Coding Sheet	75
	Appendix B: Experimental Research – Pre-Test Survey	79
	Appendix C: Experimental Research – <i>Skeptic</i> Article (<i>Washington Times</i> – 11/14/04)	83
	Appendix D: Experimental Research – Context Article (<i>Washington Post</i> – 11/9/04)	85
	Appendix E: Experimental Research – Post-Test Survey	87

List of Figures

FIGURE		PAGE
Figure 1	Natural and enhanced greenhouse effects	11
	<p>“The greenhouse effect keeps the earth warm and habitable; without it, the earth’s surface would be about 60 degrees Fahrenheit colder on average. [T]he enhanced greenhouse effect means even more of the sun’s heat is trapped, causing global temperatures to rise” (Pew Center on Global Climate Change-a, p.2).</p>	
Figure 2	“Keeling Curve”	12
	<p>Series measurements of atmospheric carbon dioxide taken at Mauna Loa Observatory, Hawaii. The data confirmed that the increased accumulation of carbon dioxide produced by burning fossil fuels and other industrial products, contributed to the greenhouse effect (Scripps CO2 Program, 2007).</p>	
Figure 3	Atmospheric CO ₂ concentrations over past 420 thousand years	13
	<p>The Mauna Loa record placed in the context of the variations in CO₂ over the past 420,000 years, based on reconstructions from polar ice cores. During ice ages, the CO₂ levels were around 200 parts per million (ppm), and during the warmer interglacial periods, the levels were around 280 ppm. The levels in 2005 were around 378 ppm (Scripps CO2 Program, 2007).</p>	
Figure 4	Global and continental temperature change	17
	<p>“Comparison of observed continental- and global-scale changes in surface temperature with results simulated by climate models using natural and anthropogenic forcings. Decadal averages of observations are shown for the</p>	

period 1906 to 2005 (black line) plotted against the centre of the decade and relative to the corresponding average for 1901–1950. Lines are dashed where spatial coverage is less than 50%. Blue shaded bands show the 5–95% range for 19 simulations from five climate models using only the natural forcings due to solar activity and volcanoes. Red shaded bands show the 5–95% range for 58 simulations from 14 climate models using both natural and anthropogenic forcings” (IPCC, 2007-a, p.11).

Figure 5	Author affiliation	55
Figures 6 & 7	Scientist citations	56
Figure 8	Government official citations	56
Figure 9	Government official belief citations	57
Figure 10	Advocate citations	57
Figure 11	Think tank associate citations	58
Figure 12	Research document citations	58
Figure 13	Al Gore and An Inconvenient Truth citations	59
Figure 14	Relative scientific acceptance of global warming view citations	59
Figure 15	Article tone	60
Figure 16	Respondents’ beliefs	61
Figure 17:	Most scientists’ beliefs	61
Figure 18	Skeptic article treatment	62
Figure 19	Control article treatment	63
Figures 20 & 21	Citation percentages and totals	64

Chapter I

Introduction

“Most of the observed increase in global average temperatures since the mid-20th century is *very likely* due to the observed increase in anthropogenic greenhouse gas concentrations” (IPCC, 2007a, p.10). This statement from working group I of the most recent assessment report by the United Nations’ Intergovernmental Panel on Climate Change reveals the international scientific consensus view that manmade emissions are very likely, or 90 percent certain, to be the cause of global warming.

On whether or not global warming exists, the IPCC goes on to state that “[w]arming of the climate system is *unequivocal*, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level” (p.5). The report notes that 11 of the last 12 “years (1995-2006) rank among the 12 warmest years in the instrumental record of global surface temperature (the average of near-surface air temperature over land and sea surface temperature) since 1850” (p.5).

As for future impacts, “[c]ontinued greenhouse gas emissions at or above current rates would cause further warming and induce many changes in the global climate system during the 21st century that would *very likely* be larger than those observed during the 20th century” (p.13).

The National Academy of Sciences, when asked by the Bush administration to prepare a document answering questions on climate change science, agreed that

“[g]reenhouse gases are accumulating in Earth’s atmosphere as a result of human activities, causing surface air temperatures and subsurface ocean temperatures to rise” (p.1), and that the IPCC’s 2001 report “accurately reflects the current thinking of the scientific community on this issue” (National Research Council, 2001, p.3).

A 2004 content analysis of 928 articles with the words *climate change* in their abstracts published in refereed scientific journals between 1993 and 2003 reinforced the consensus claim: none of the papers disagreed with the consensus view on global warming (Oreskes, 2004).

Despite the solidification of a scientific consensus over the last twenty-plus years, a public consensus has yet to emerge. In 2006, between 35 and 65 percent of the American public agreed that a scientific consensus existed on whether or not global warming is even happening. When asked if “a lot of disagreement exists among scientists,” respondents agreed 62, 67, 64 and 56 percent of the time in 1997, 1998, 2006 and 2007, respectively (Nisbet & Myers, 2007, pp.451, 452).

Since most Americans get their scientific information from the news media (Corbett and Durfee, 2004), the burden to interpret whether or not a scientific consensus is present falls on the shoulders of journalists. In S. Holly Stocking’s essay on “How Journalists Deal With Scientific Uncertainty,” (Friedman, Dunwoody & Rogers, 1999) the burden of writing an interesting story seems to trump the need to investigate the relative weight of agreement on contradictory scientific discourses. “Journalists have been found to pit scientists against scientist, with little or no discussion of the reason for disagreements, and often without mention of the relative degree of scientific acceptance of the differing views” (Friedman, et al, p.29). Reporting on *dueling experts* seems to

come from the media routine of seeking opinions from all sides of an issue in an effort to give balance to the news piece (Friedman, et al, p.33).

Such seemingly objective reporting can hinder a reader's ability to make a balanced assessment of a situation because the reports' "scattered oppositional facts" may include well framed stances appearing equally or more valid than other stances that are factually superior (Entman, 1993). Such is the case described by Stephen H. Schneider, senior scientist at the National Center for Atmospheric Research in Boulder, Colorado: "A hundred-scientist, thousand-reviewer assessment of climate change by the United Nations was often balanced in news reports by dissenting views of a handful of opponents with little guidance to the public about which group more closely represented the mainstream scientific community" (Friedman, et al, p.81).

Statement of the Problem

In 1989, one year after global warming was put on the national agenda by the Congressional testimony of NASA's chief climate scientist James Hansen (Armitage, 2005) and the first meeting of the IPCC, representatives from the oil, coal, automobile and other industries created the Global Climate Coalition (GCC) (Rampton & Stauber, 2001, p.270). In 1991, members of the energy industry created a public relations front group called the Information Council for the Environment (ICE) (Rampton & Stauber, 2001, p.272). The GCC, ICE and other industry-backed organizations have used a small group of *skeptic scientists* as experts in challenging the veracity of climate change science and, through creation of uncertainty, caused political inaction on carbon emissions regulation (Rampton & Stauber, 2001; Gelbspan, 1998).

These same scientists were, and continue to be, fellows at prominent industry-funded think tanks self-described as ideologically conservative. This type of think tank was found to be the most effective at gaining media visibility (Rich & Weaver, 2000). Think tanks most influential on global warming policy (McCright & Dunlap, 2000) were found to have teamed up with the skeptic scientists and helped them secure media visibility comparable to that of mainstream scientists (McCright & Dunlap, 2003).

A study in major U.S. newspapers between 1988 and 2002 of the media visibility of global warming arguments, disputing the effects of man on global warming and whether or not mitigating actions should be taken, found an overwhelming balance. In light of the scientific consensus on the effects of man on global warming and the need for ameliorative action, the researchers found the balance in media visibility to be an incredible bias serving to deceive the public (Boykoff & Boykoff, 2004).

Purpose of the Study

This study will measure the media visibility of global warming articles in the *Washington Post* and the *Washington Times* over the three-month period in 2006 in the middle of which the movie *An Inconvenient Truth* was released. This is an appropriate time period to study considering the intense coverage of the movie's release and the resultant discussion on global warming that it inspired. Following the methods used in studies by McCright and Dunlap and Boykoff and Boykoff, the author will measure the citations of global warming *experts* and members of think tanks and, most importantly, track whether the articles support, refute or give balanced coverage to the claim that there

is a scientific consensus stating that global warming in the 20th century is due to the rise of manmade carbon emissions.

In an effort to take a snapshot of public opinion on global warming, and to measure the effects of framing in global warming articles, the researcher will conduct an experiment. Subjects will complete a survey on their knowledge of, and opinions on, global warming. They will be subjected to either a control or experimental article, and then a post-test survey will be completed to monitor any framing effects. The monitored effects will lend proof to the claim that media balance is a form of bias when used on the controversial scientific topic of global warming.

Definition of Terms

Global Warming – the progressive gradual rise of the Earth's average surface temperature caused in part by increased concentrations of GHGs in the atmosphere (Pew Center on Global Climate Change, 2007).

Climate change – a change of climate attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods (United Nations, 1992).

Consensus - the judgment arrived at by most of those concerned (Meriam-Webster Online Dictionary, 2007).

Anthropogenic emissions – emissions of greenhouse gasses resulting from human activities (Pew Center on Global Climate Change, 2007).

Greenhouse effect – the insulating effect of atmospheric greenhouse gases (e.g., water vapor, carbon dioxide, methane, etc.) that keeps the Earth's temperature about 60°F warmer than it would be otherwise (Pew Center on Global Climate Change, 2007).

Greenhouse Gas (GHG) - any gas that contributes to the "greenhouse effect" (Pew Center on Global Climate Change, 2007).

Journalistic objectivity – journalists' commitment to the idea of balancing opposing claims, regardless of the relative merit of the claims or claimsmakers (Stocking & Holstein, 2006; Entman, 1993; Tuchman, 1972).

Media bias – “The divergence of prestige-press global-warming coverage from the general consensus of the scientific community” (Boykoff & Boykoff, 2004).

Think tanks – “Independent, non-interest-based, nonprofit organizations that produce and principally rely on expertise and ideas to obtain support and to influence the policymaking process. Operationally, think tanks are 501(c)3 nonprofit organizations that conduct and disseminate research and ideas on public policy issues. Politically, think tanks are aggressive institutions that actively seek to maximize public credibility and political access to make their expertise and ideas influential in policymaking” (Rich, 2005, p. 11).

Experts – used in the *third party technique*, they convey independence and reliability on whatever subject their expertise lies in (Rampton & Stauber, 2001, p.17).

Skeptic scientists – the group of scientists who believe there is uncertainty as to the influence of manmade emissions on global warming; most often represented by: Sallie Baliunas, Robert Balling, Jr., Richard Lindzen, Patrick Michaels, and S. Fred Singer (McCright & Dunlap, 2003).

Elite scientists – the leading scientists who believe, with a high degree of certainty, that manmade emissions are responsible for global warming; the mainstream scientific belief, most often represented by: Stephen Schneider, F. Sherwood Rowland, Bert Bolin, James E. Hansen and Benjamin Santer (McCright & Dunlap, 2003).

Hypotheses and Research Questions

Hypotheses tested:

Content Analysis

- H1 Global warming articles will be authored by think tank associates more often in the *Washington Times* rather than the *Washington Post*.
- H2 Most global warming articles discussing the existence of a scientific consensus found in the *Washington Post* will be of a balanced nature; i.e. give equal credence to experts on both sides of the consensus issue.

Experimental Study

- H3 Most subjects will agree that global warming is caused by anthropogenic or manmade greenhouse gas emissions.
- H4 More than half of the subjects will agree that there is a scientific consensus on the cause of global warming.
- H5 Subjects exposed to treatment showed more uncertainty concerning the scientific consensus on the cause of global warming than those in the control group.

Research questions asked:

Content Analysis

- R1 Are more think tank authored global warming articles found in conservative-leaning newspapers than in liberal-leaning newspapers?
- R2 Does the *Washington Post*, a liberal-leaning newspaper, allow competing viewpoints on global warming to be heard equally?

Experimental Study

- R3 How many subjects will agree that global warming is manmade?
- R4 How many subjects will agree that a scientific consensus exists on the main cause of global warming?
- R5 Does context in articles on scientific controversy allow for better understanding of known scientific uncertainty?

The Assumptions

Global warming is manmade, there is a scientific consensus asserting that global warming is manmade and members of carbon-emitting industries have, and continue to intentionally sow doubt about the certainty of global warming science.

Content Analysis

Think tank authored articles will urge the uncertainty of global warming science and call for resistance to government regulation of carbon emissions.

Experimental Study

Subjects will answer survey questions truthfully. Subjects least knowledgeable of global warming will be most susceptible to framing.

The Limitations

The sample size of the content analysis and research experiment are limited by time and money. The study will employ a convenience sample comprised of Rowan University undergraduate public relations and public relations/advertising students. Measuring media bias through a three-month sample of two newspapers may not be enough to generalize the entire American newspaper industry.

Significance of the Study

This study will show that, in cases of scientific controversy, the presentation of a contrary opinion without mention of its scientific weight will lead to deception of those unfamiliar with the context of the issue.

This study will stand as an example to reporters covering controversial issues as to why they must relay contextual information to their readers. This study serves as a warning to users of media to search for context in any story they read to avoid possible deception. This same lesson applies to the results of the study's experimental portion. From a public relations perspective, this study will show the value of third party testimonials in influencing attitudes, opinions and behaviors.

Chapter II

Review of the Literature

The researcher used the following resources:

- Electronic databases including: SAGE Journals Online, Academic Search Premier, Communication & Mass Media Complete
- Rowan University Campbell Library circulation database
- E-ZBorrow interlibrary book loan
- <http://scholar.google.com> search engine

Key words used to locate information include: think tanks, global warming, climate change, public policy, public opinion, framing, framing effects, scientific uncertainty, journalistic objectivity.

Global Warming

Explanation and Early Research

The greenhouse effect is the insulating effect of atmospheric greenhouse gases (e.g., water vapor, carbon dioxide, methane, etc.) that keeps the Earth's temperature about 60 degrees Fahrenheit warmer than it would be otherwise (Pew Center on Global Climate Change-b). This natural greenhouse effect has been augmented significantly since the beginning of the Industrial Revolution in the 19th century due to ever-increasing

emissions of carbon dioxide into the atmosphere (Pew Center on Global Climate Change-a; Toman, 2001, p.11).

By altering the process by which naturally occurring greenhouse gases trap the sun's heat before it can be released back into space, the burning of fossil fuels like coal and oil has created an *enhanced greenhouse effect* (Pew Center on Global Climate Change-a; see Figure 1). The link between increasing levels of carbon dioxide in the atmosphere and increasing surface temperatures was first suggested by Swedish chemist Svante Arrhenius in 1896 (Krosnick, Holbrook & Visser, 2000). Until 1958, there were no reliable measurements of atmospheric carbon dioxide and most scientists assumed the industrially produced carbon dioxide was being harmlessly absorbed by the oceans (Toman, 2001, p.11).

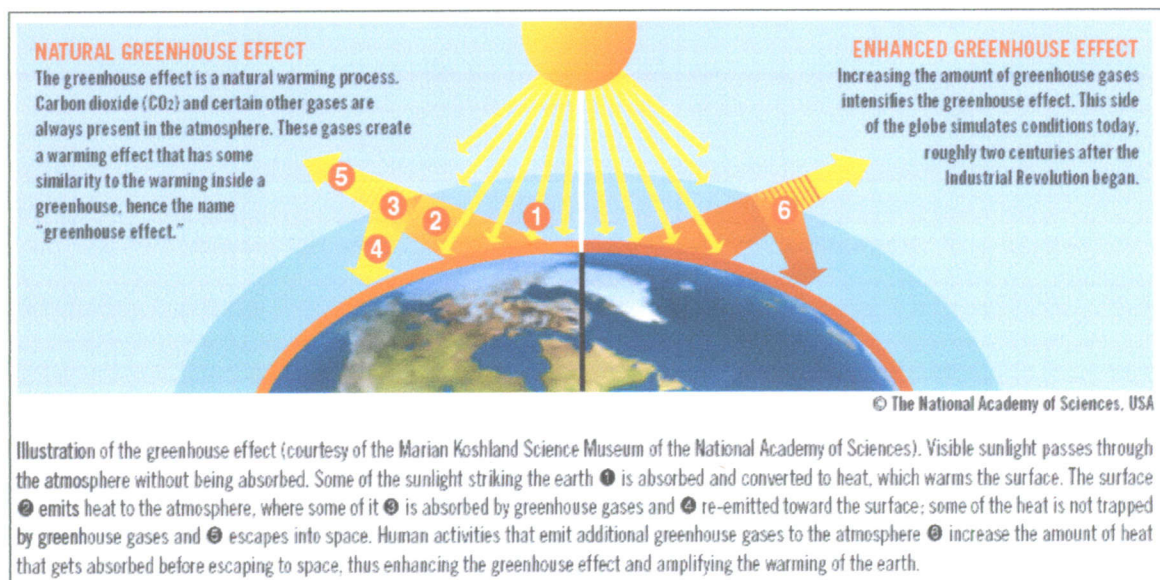


Figure 1. Natural and enhanced greenhouse effects.

Beginning in 1958, Charles David Keeling, in conjunction with the Scripps Institute of Oceanography at the University of California, San Diego and the National

Oceanic and Atmospheric Administration, sampled atmospheric carbon dioxide levels from an observatory atop Mauna Loa in Hawaii. Data from the monthly samples showed a rise in the volume of carbon dioxide in the atmosphere from around 315 parts per million in 1958 to around 378 ppm in 2005 (see Figure 2). The data also showed that 57 percent of carbon emissions remain airborne, while the rest is absorbed by the oceans and land.

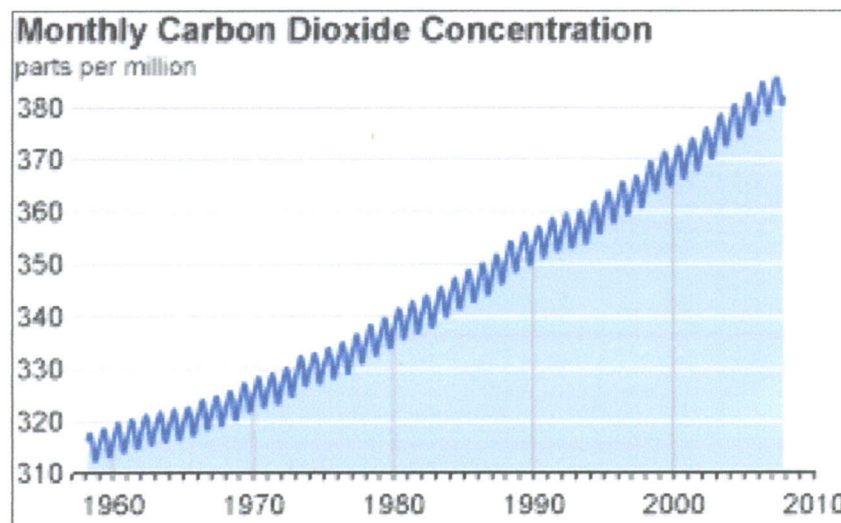


Figure 2. "Keeling Curve."

Put into a geological context, the carbon dioxide variations over the past 420,000 years, based on reconstructions from polar ice cores, during ice ages, the carbon dioxide levels were around 200 ppm, and during the warmer interglacial periods, the levels were around 280 ppm (Keeling, et al., 2005; see Figure 3).

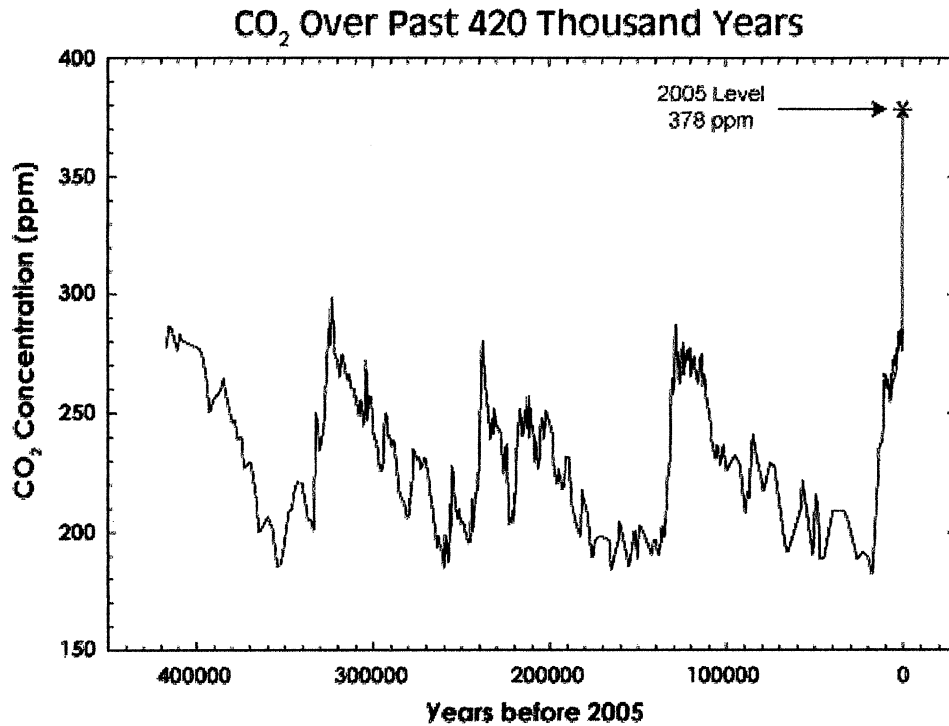


Figure 3. Atmospheric CO₂ concentrations over past 420 thousand years.

Development of a Scientific Consensus

In 1979, the World Meteorological Organization and other United Nations agencies including the UN Environmental Program held the first World Climate Conference in an effort to build awareness and gain recognition for climate change as an international concern (Toman, 2001, p.12; WMO, 2007). In 1985, the WMO, UNEP and the International Council of Scientific Unions met in Villach, Austria, with scientists from 27 countries to assess the impact of greenhouse gas emissions on the climate (Toman, 2001, p.12).

In June of 1988, following successful international agreements to set legally binding limits on the consumption of chlorofluorocarbons to protect atmospheric ozone (1986 Vienna Convention/ 1987 Montreal Protocol), United States Senator Timothy

Worth (D-Colorado) took advantage of a record heat wave and widespread drought to call a hearing on global climate change. James E. Hansen, director of the National Aeronautics and Space Administration's Institute for Space Studies, testified to Congress that the enhanced greenhouse effect is very probably related to the burning of fossil fuels (Toman, 2001, pp.13, 14).

In December 1988, the UN General Assembly approved the establishment of the Intergovernmental Panel on Climate Change, a joint project of the WMO and UNEP. The IPCC was created to “assess on a comprehensive, objective, open and transparent basis the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts and options for adaptation and mitigation. The IPCC does not carry out research nor does it monitor climate related data or other relevant parameters. It bases its assessment mainly on peer reviewed and published scientific/technical literature” (IPCC, 2007-b; The Royal Society, 2005).

Its first climate change assessment report was completed in 1990 and served to prepare negotiations of a framework convention at the UN Conference on Environment and Development in Rio de Janeiro, Brazil, in 1992 (IPCC, 2004). The United Nations Framework Convention on Climate Change was opened for signature at Rio and entered into force in 1994, at which time over 150 countries were signatories (IPCC, 2007-b; Armitage, 2005; IPCC, 2004; Toman, 2001, p.15). The UNFCCC's final language set a voluntary goal of cutting emissions back to the 1990 level by 2000, but contained no enforceable commitments (Toman, 2001, p.15).

The IPCC's Second Assessment Report of 1995 provided input for the negotiations of the Kyoto Protocol at the third Conference of the Parties under the UNFCCC in 1997 (COP-1 was in 1995, COP-2 in 1996) (IPCC, 2007-b; IPCC, 2004). The 1995 document noted that "the balance of evidence suggests a discernible human influence on global climate" (IPCC, 2004, p.6). The Third Assessment Report of 2001 concluded that "most of the observed warming over the last 50 years is *likely* [i.e., greater than 66 percent likely] to have been due to the increase in greenhouse gas concentrations" (IPCC, 2007-a, p.10).

The National Academy of Science, developed by the Lincoln Administration in 1863 (NAS, 2007), was called upon in 2001 by the Bush Administration to verify the results of the IPCC's Third Assessment Report. Its report, *Climate Change Science: An Analysis of Some Key Questions*, stated that "the IPCC's conclusion that most of the observed warming of the last 50 years is likely to have been due to the increase in greenhouse gas concentrations accurately reflects the current thinking of the scientific community on this issue" (National Research Council, 2001, p.3). The Royal Society, the United Kingdom's 400 year old independent science academy, also agreed that the IPCC's 2001 report was accurate in its characterization of the observed warming of the last 50 years. Issuing similar statements of agreement were the American Meteorological Society, the American Geophysical Union and the American Association for the Advancement of Science (Oreskes, 2004).

Naomi Oreskes, writing in *Science* (2004), served to further solidify the notion of a scientific consensus on whether the observed warming of the last 50 years is due to the increase in greenhouse gas concentrations. She conducted a content analysis of 928

papers published in peer-reviewed scientific journals between 1993 and 2003 found in a search of the ISI database using the keywords *climate change*. Her random sample represented approximately 10 percent of the literature. She found that three-quarters of the papers either explicitly or implicitly accepted the consensus view, while none rejected it (The Royal Society, 2005; Oreskes, 2004).

The IPCC's latest assessment report from 2007 "considers longer and improved records, an expanded range of observations and improvements in the simulation of many aspects of climate and its variability based on studies since the" Third Assessment Report (IPCC, 2007-a, p.10). The report concludes that "most of the observed increase in global average temperatures since the mid-20th century is *very likely* [i.e., greater than 90 percent likely] due to the observed increase in anthropogenic [i.e., manmade] greenhouse gas concentrations" (IPCC, 2007-a, p.10).

Based on measurements of observed changes in global average temperature and global average sea level increases and Northern Hemisphere snow cover decreases between 1960 and 1990, the report maintains that "warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level" (IPCC, 2007-a, p.5; see Figure 4).

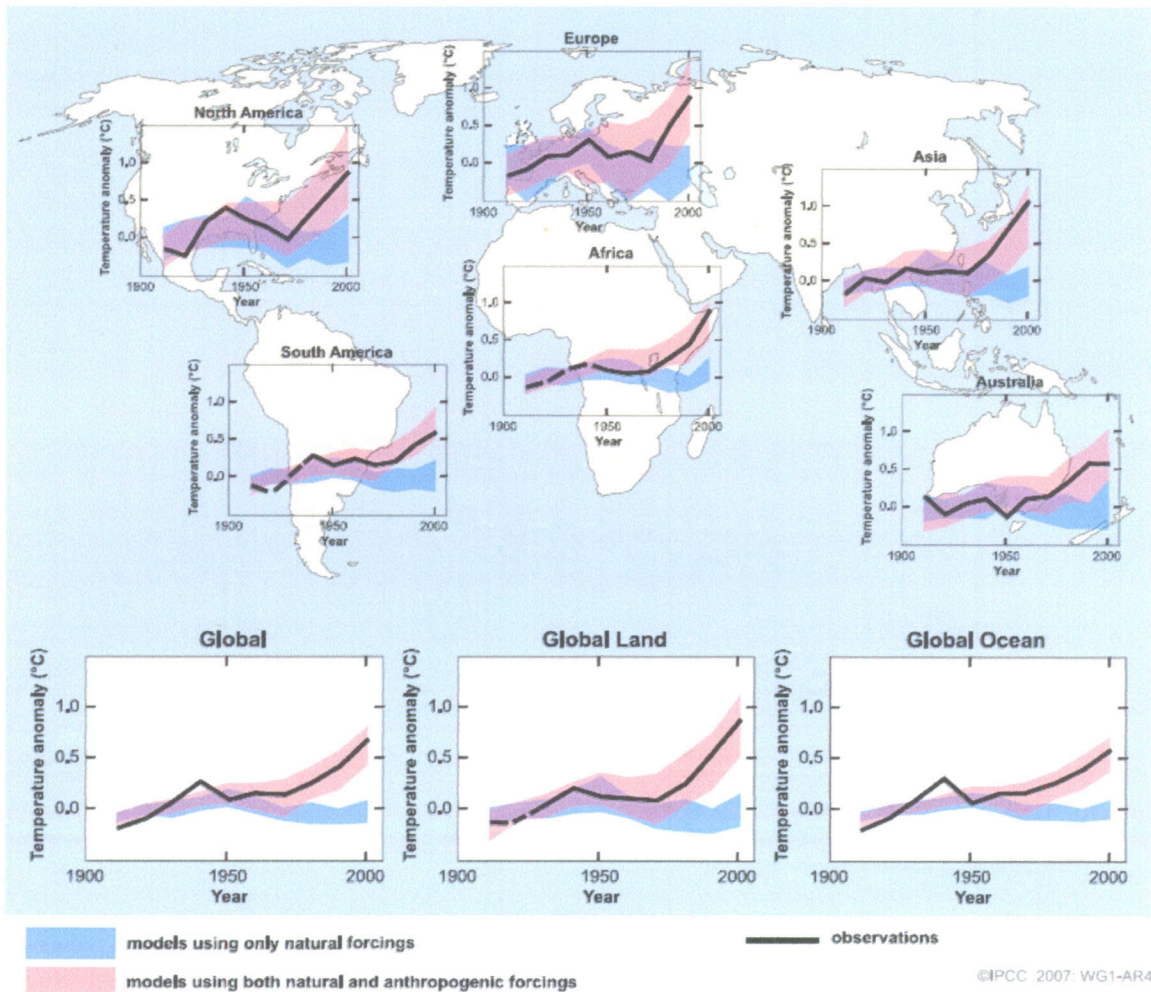


Figure 4. Global and continental temperature change. (Natural forcings = those due to solar activity and volcanoes; anthropogenic forcings = those primarily due to fossil fuel use)

“Many details about climate interactions are not well understood, and there are ample grounds for continued research to provide a better basis for understanding climate dynamics. The question of what to do about climate change is also still open. But there is a scientific consensus on the reality of anthropogenic [i.e., manmade] climate change” (Oreskes, 2004, p.1686).

Public Perceptions

Existence of Global Warming

Four surveys conducted by the Pew Research Center for the People & the Press in 2006 and 2007 showed a growing public certainty on the existence of global warming. Nationally representative samples of adults with sample sizes over 1,000 were asked if there is “solid evidence that the earth is warming” agreed 70, 79, 77 and 77 percent of the time (Pew Research Center, 2007, p.1).

Scientific Consensus on Existence of Global Warming

Cambridge and Gallup surveys, based on nationally representative adult samples with sample sizes of 1,000 or more, asked whether or not “most scientists believe that global warming is occurring” in 1994, 1997, 2001 and 2006. Respondents agreed 28, 45, 61 and 65 percent of the time, respectively (Nisbet & Myers, 2007, p.452). In nationally representative polls conducted by Ohio State University and ABC News, when asked if they believed that “most scientists agree with one another about whether or not global warming is happening,” respondents agreed 35 percent of the time in 1997 ($N = 688$), 30 percent in 1998 ($N = 753$), 35 percent in 2006 ($N = 1,002$) and 40 percent in 2007 ($N = 1,002$). Sixty-two, 67, 64 and 56 percent of respondents perceived “a lot of disagreement” among scientists for those same years (Nisbet & Myers, 2007, p.453).

Existence of Manmade Global Warming

The Pew surveys from 2006 and 2007 reported that respondents, when asked if global warming is due to human activity, replied in the affirmative only 41, 50, 47 and 47 percent of the time (Pew Research Center, 2007, p.1).

Scientific Uncertainty & the Media

Science Communication

Scientific work does not just reduce uncertainty, it actively constructs it. Scientists seek to identify uncertainties that require their special skills and knowledge to address (Smithson, 1989 in Zehr, 1999, p.4). When communicating about their work in academic and public communications, scientists frequently emphasize these uncertainties (Moser & Dilling, 2004).

Most people obtain knowledge about science from mass media, not scientific publications or actual involvement in scientific research (Corbett & Durfee, 2004). Because “[s]cience is an encoded form of knowledge that requires translation in order to be understood” (Ungar, 2000, p.308), people most often understand science through the “filter of journalistic language and imagery” (Nelkin, 1995 in Corbett & Durfee, 2004, p.130).

Moser and Dilling (2004) suggest that the major reasons for the miscommunication of climate science to the public include climate system time lags, the creeping nature of climate change and media *objectivity*.

Climate System Dynamics

Time lags between the emissions of heat-trapping gases and subsequent impacts on the climate mean that the connection between actions today and their effects on the climate is difficult to perceive. Carbon dioxide in the atmosphere today has accumulated over centuries, with only a small fraction being reabsorbed by oceans and land during that time. The creeping nature of climate change, with its miniscule day-to-day changes makes it barely perceptible at all. “Once creeping environmental problems are identified and determined to be serious enough to act upon, it may be too late to reverse the damage” (Moser & Dilling, 2004, p.34).

Sterman and Sweeney (2007) found that MIT graduate students, studying mostly mathematics and the sciences, widely misunderstood climate system time lags. “The belief that emissions, atmospheric CO₂, and temperature are correlated leads to the erroneous conclusion that a drop in emissions would soon cause a drop in CO₂ concentrations and mean global temperature.” Most subjects found that carbon dioxide could be stabilized by stabilizing emissions at or above current rates, even while emissions continued to exceed its removal. “Such beliefs – analogous to arguing a bathtub filled faster than it drains will never overflow – support wait-and-see policies, but violate basic laws of physics” (Sterman & Sweeney, 2007, p.24).

Journalistic Objectivity

The most significant reason for the miscommunication of climate science to the public, according to Moser and Dilling (2004), is journalistic *objectivity*. The balancing of the “scientific consensus with the voices of a comparatively tiny number of contrarians

overstates the actual degree of disagreement” (Moser & Dilling, 2004, p.36). However, by emphasizing controversy or disagreement among scientists, traditional news values are fulfilled, drama is added to the story and journalists are provided with a pretext of objectivity by having presented multiple sides of an issue (Corbett & Durfee, 2004). Boykoff and Boykoff (2004) saw this *balance* as an informational bias.

Boykoff and Boykoff looked at a random sample of 636 articles from the *New York Times*, the *Los Angeles Times*, the *Washington Post* and the *Wall Street Journal* between 1988 and 2002. They found that coverage of opposing global warming views were balanced in 52.65 percent of the articles. The contrasting views indicated that either *humans were contributing to global warming* or that *exclusively natural climate fluctuations explained the Earth’s temperature increase*. These findings supported their hypothesis that journalistic balance can often lead to a form of informational bias.

New York Times global environmental change reporter Andrew Revkin agreed with the basic premise of the Boykoffs’ 2004 study. He noted, however, “that the analysis focuses only on the quantitative aspect of climate-change coverage, rather than more subtle qualitative questions such as how reporters *characterize the voices* of the people they quote” (Mooney, 2004, p.31).

Context

When covering complex scientific issues, the inclusion of scientific context has been found to mitigate the uncertainty caused by scientific controversy (Corbett & Durfee, 2004). Ideally, a balanced story on a complex scientific issue would let audiences know which claims are supported by scientific consensus and which are not (Rowan, 1999,

p.207). However, journalistic news routines work against the inclusion of context. Time is limited and researching the context of every scientific claim might not be within a journalist's purview (Corbett & Durfee, 2004).

Journalist Ignorance

Most journalists have generally limited science training (Stocking & Holstein, 2006). Even members of the Society of Environmental Journalists were found to be confused about the basic science of climate change and the scientific debate about predicted effects. These journalists relied heavily on newspapers for their global warming knowledge (Wilson, 2000).

Such ignorance leaves many journalists quite susceptible to assertions about the various unknowns and uncertainties in science, labeled by Stocking and Holstein (2006) as *ignorance claims*. "Claimsmakers who offer contrary views, however outrageous, often are quoted in news stories because their inclusion reinforces the impression of journalistic objectivity," giving readers little guidance about the scientific significance of differing views (Stocking & Holstein, 2006, p.11; Nelkin, 1987, p.92).

Journalists' Power to Validate

Journalists serve as validators of facts when they report on controversial issues. Gamson defines facts as "institutionally validated claims about the world." He uses the example of the Church in the Middle Ages as a primary validator of *facts* including the existence of witches and a flat Earth. "The Church had social power to certify certain claims about the world as fact" and so *facts* were made and perceived as such by the

public. Gamson compares this with the media's role as gatekeeper, giving *facticity* to the claims of would-be primary validators by deciding whether or not to give them a voice and deciding how much of a voice to give them (i.e., *agenda setting* (McCombs & Shaw, 1972 in Scheufele & Tewksbury, 2007)) (Gamson, 1999, p.23). Gamson adds, if no primary validators are cited, the journalist becomes the primary validator of facts about the contested issue, whether the journalist is knowledgeable about the issue or not.

Framing

When claims about issues are given different levels of attention and validity, they are given different levels of salience; i.e., “making a piece of information more noticeable, meaningful, or memorable to audiences. An increase in salience enhances the probability that receivers will perceive the information, discern meaning and thus process it, and store it in memory” (Entman, 1993, p.53). When the description of an issue is changed to enhance its salience, and its meaning is kept constant, framing has occurred. Framing also “refers to the process by which people develop a particular conceptualization of an issue or reorient their thinking about an issue” (Chong & Druckman, 2007, p.104). Framing effects “occur when (often small) changes in the presentation of an issue or an event produce (sometimes large) changes of opinion” (Chong & Druckman, 2007, p.104).

Goffman (1974) argued that individuals struggle to efficiently process new information and make sense of the world around them and, therefore, apply interpretive schemas or *primary frameworks* to classify information and interpret it meaningfully. Framing, therefore, is both a macrolevel and a microlevel construct (Scheufele, 1999 in Scheufele & Tewksbury, 2007). As a macroconstruct, *framing* refers to “modes of

presentation that journalists and other communicators use to present information in a way that resonates with existing underlying schemas among their audience (Shoemaker & Reese, 1996)” (Scheufele & Tewksbury, 2007, p.12). “As a microconstruct, *framing* describes how people use information and presentation features regarding issues as they form impressions” (Scheufele & Tewksbury, 2007, p.12).

Therefore, when journalists allow arguments to be framed as valid, despite any contextual support, they confer legitimacy on the individual(s) presenting the arguments and on the seemingly valid claims (Dunwoody, 1999, p.72). The power of journalists to confer legitimacy (i.e., *facticity*) on strongly framed, yet, inaccurate claims has been “implicated in the success of the tobacco industry in ... manufacturing doubt about scientific findings when reporting on the links between smoking and cancer” (Miller, 1992 & Tuchman, 1972 in Stocking & Holstein, 2006, p.11).

“Indeed, it is journalists’ professional commitment to the idea of balancing opposing claims, regardless of the relative merit of the claims or claimsmakers (Dunwoody, 1999; Stocking, 1999; Dearing, 1995; Wilkins, 1993), that has been implicated in the documented distortions of the knowledge of global warming and in the apparent confusion of the public and policymakers with respect to this issue” (Boykoff & Boykoff, 2004 & Zehr, 2000 in Stocking & Holstein, 2006, p.11).

Two-Step Flow Theory of Media Effects

News media editors decide which stories make it to print. By the *gatekeepers* giving claimsmakers a voice, they give the interests behind those voices an opportunity to influence the attitudes and behaviors of those directly involved with their interests. The

two-step flow theory of media effects describes this process as beginning with the “media setting the agenda, [allowing] influentials [to] pick up ideas and messages from the media, endors[e] them, and influence[e] target publics to know, feel or do something about the agenda” (Bagin & Fulginiti, 2005, p.357).

When the interests of carbon-emitting industries are voiced through seemingly independent third-parties and journalists do not offer context as to the relative weight of those experts’ arguments, the interests’ arguments are put on equal footing with those of the international scientific community. The two-step flow theory illustrates how an argument or message can be laundered through a third-party, through the news media, to independent influentials and then on to target publics, exposing them to seemingly unbiased messages and possibly influencing them to mobilize or remain inactive.

The Claimsmakers

Issues Management

The issues management discipline came of age in the mid-1970s when activism posed a challenge to the wellbeing of various industries. “One harbinger for the interest in issues management was the innovative use of op-eds by Mobil Oil Company to counter what it believed to be unfair and uninformed criticism of big business in general and the oil industry in specific” (Heath & Bowen, 2002, p.230). Corporate communications expert James O’Toole recommended advocacy advertising to counterbalance challenges against corporate policy and actions by critical reporters and activists in the 1970s (Heath & Bowen, 2002). W. Howard Chase, as chairperson of the Issues Management Association, defined issues management as:

The capacity to understand, mobilize, coordinate, and direct all strategic and policy planning functions, and all public affairs/public relations skills, toward achievement of one objective: meaningful participation in creation of public policy that affects personal and institutional destiny. (Chase, 1982, in Heath & Bowen, 2002, pp.230-231)

“Corporations turn to public issues management to make it possible to shape government policy on issues that affect them, rather than just to adapt to policy changes that already have been made” (Grunig & Hunt, 1984, p.296). One of the most potentially damaging issues facing corporations in the oil, coal and automobile industries was, and is, carbon emissions regulation. Instead of adapting to carbon-limiting policy changes, corporations in these industries have hired public relations agencies and conservative think tanks to help manage the issue from behind the scenes and shape government policy in their favor (Fisher, 2006; McCright & Dunlap, 2003; Rampton & Stauber, 2001; Gelbspan, 1998).

Carbon Industry

“Industry’s PR strategy is not aimed at reversing the tide of public opinion, which may in any case be impossible. Its goal is simply to stop people from mobilizing to do anything about the problem, to create sufficient doubt in their minds about the seriousness of global warming that they will remain locked in debate and indecision” (Rampton & Stauber, 2001, p.271).

In 1989, following James Hansen’s highly publicized testimony before Congress and shortly after the formation of the IPCC, the Burson-Marsteller public relations firm

created the Global Climate Coalition (GCC) (Rampton & Stauber, 2001). William O’Keefe, the current CEO of the conservative George Marshall Institute, a former executive for the American Petroleum Institute, chaired the GCC which “operated until 1997 out of the offices of the National Association of Manufacturers. Its members have included the American Automobile Manufacturers Association, Amoco, the American Forest and Paper Association, American Petroleum Institute, Chevron, Chrysler, the U.S. Chamber of Commerce, Dow Chemical, Exxon, Ford, General Motors, Mobil, Shell, Texaco, Union Carbide, and more than 40 other corporations and trade associations” (Rampton & Stauber, 2001, p.270).

Since 1994, GCC alone has spent more than \$63 million to combat any progress toward addressing the climate crisis. Its efforts are coordinated with separate campaigns by many of its members, such as the National Coal Association, which spent more than \$700,000 on the global climate issue in 1992 and 1993, and the American Petroleum Institute, which paid Burson-Marsteller \$1.8 million in 1993 for a successful computer-driven “grassroots” letter and phone-in campaign to stop a proposed tax on fossil fuels.

[GCC’s] propaganda budget serve[ed] solely to influence the news media and government policymakers on a single issue and comes on top of the marketing, lobbying, and campaign contributions that industry already spends in the regular course of doing business. In 1998, the oil and gas industries alone spent \$58 million lobbying the US Congress. For comparison’s sake, environmental groups spent a relatively puny total of

\$4.7 million—on all issues combined, not just global warming. (Rampton & Stauber, 2001, p.271)

The Information Council on the Environment, ICE, was created by the National Coal Association, Western Fuels Association, Inc. and Edison Electrical Institute in 1991. “Using the ICE, the coal industry launched a blatantly misleading campaign on climate change that had been designed by a public relations firm. This public relations firm clearly stated that the aim of the campaign was to ‘reposition global warming as theory rather than fact.’ Its plan specified that three of the so-called greenhouse skeptics—Robert Balling, Pat Michaels, and Sherwood Idso—should be placed in broadcast appearances, op-ed pages, and newspaper interviews (Rampton & Stauber, 2001, p.272; Gelbspan, 1998, p.34).

In its 1994 annual report, Western Fuels Association, a nonprofit “cooperative that supplies coal and transportation services to consumer-owned electric utilities throughout the Great Plains, Rocky Mountain and Southwest regions” (Western Fuels Association, Inc., 2007), declared that:

there has been a close to universal impulse in the [fossil fuel] trade association community in Washington to concede the scientific premise of global warming while arguing over policy prescriptions that would be the least disruptive to our economy. We have disagreed, and do disagree, with this strategy. (Gelbspan, 1998, p.36)

Western Fuels elaborated on its approach in another report:

When [the climate change] controversy first erupted at the peak of summer in 1988, Western Fuels Association decided it was important to

take a stand. [S]cientists were found who are skeptical about much of what seemed generally accepted about the potential for climate change. Among them were [Pat] Michaels, Robert Balling of Arizona State University, and S. Fred Singer of the University of Virginia. Western Fuels approached Pat Michaels about writing a quarterly publication designed to provide its readers with critical insight concerning the global climatic change and greenhouse effect controversy. Western Fuels agreed to finance publication and distribution of *World Climate Review* magazine. (Gelbspan, 1998, p.36)

In 1998, representatives from the American Petroleum Institute, Exxon, Chevron and the Southern Company developed a “Global Climate Science Communications Action Plan.” The draft plan, leaked to the New York Times in a memo, called for giving skeptic scientists “the logistical and moral support they have been lacking” (Cushman, 1998). The memo called for spending \$5 million over two years to “maximize the impact of scientific views consistent with ours in Congress, the media and other key audiences.” They planned on doing this by “identify[ing], recruit[ing] and train[ing] a team of five independent scientists to participate in media outreach.” The overall plan was to create a “one-stop resource on climate science for members of Congress, the media, industry and all others concerned.” The planned method of measuring progress was to count the percentage of news articles that raise questions about climate science and the number of radio talk show appearances by scientists questioning the prevailing views (Cushman, 1998; Dolny, 1998-a).

In December 1999, the Ford Motor Company left the Global Climate Coalition because, according to Chairman William Clay Ford, Jr., the GCC had “become to us an impediment to move forward credibly on environmental issues” (Leggett, 2001, p.323). By 2000, General Motors and Daimler-Chrysler along with oil companies Shell, Texaco and British Petroleum had all defected from GCC. The Global Climate Coalition deactivated in 2002 (Mooney, 2005-a).

ExxonMobil continued funding global warming skeptics, including over \$8 million to numerous think tanks between 2000 and 2003. Receiving the largest endowments were the Competitive Enterprise Institute (CEI) (\$1.38 million), the American Enterprise Institute (\$960,000), the Heritage Foundation (\$340,000) and the George C. Marshall Institute (\$310,00) (Mooney, 2005-b). A September 2006 letter from Britain’s Royal Society called on Exxon to live up to a July 2006 pledge to stop funding organizations that spread misleading information about climate change. The letter noted that in 2005, ExxonMobil spent \$2.9 million on 39 such groups including the CEI, the International Policy Network and the Center for the Study of Carbon Dioxide and Global Change (Timmons, 2006).

Exxon Vice President for Public Affairs Kenneth Cohen confirmed in the January 2007 *Wall Street Journal* article, “Exxon Softens Climate-Change Stance; Hoping to Shape Policy, Oil Giant Joins Dialogue on Curbing Emissions,” that Exxon decided to stop funding CEI and “five or six” other groups “active in the global warming debate” in late 2005 (Ball, 2007).

Think tanks

Independent nonprofit public policy research institutes, or think tanks, are nongovernmental groups whose principal mission is to produce and promote their expertise among policymakers (Rich & Weaver, 2000). What are now known as think tanks have been in existence in the United States since the early twentieth century (Rich, 2005, p. 72). The first think tanks, *universities without students*, were an outgrowth of Progressive Era reform and the *scientific management* movement (Smith, 1991, p. xv; House, 2003). These think tanks drew on the large pool of money provided by the budding foundations of industrialists like John D. Rockefeller, Henry Ford and Andrew Carnegie (Rich, 2005, pp.39, 40; Abelson, 2002, p.67).

Following World War II, a second wave of think tanks appeared as the government sought technical expertise for research and development in Cold War national security and the domestic war against poverty (Smith, p. xv). The RAND Corporation and the Urban Institute were two prominent beneficiaries of government contracts in these areas (Rich, 2005, p. 63). Amid the environmentalist movement sparked by Rachel Carson's *Silent Spring* and the 1970 development of the Environmental Protection Agency, anti-regulatory conservative philanthropists started to fund the creation of *advocacy think tanks*. These were ideologically-oriented and "invested as much in repackaging and marketing ideas as in research" (House, 2003, p.298).

Because "more than 75 percent of think tanks active in 1996 had been formed after 1970" (Béland, 2005, p.184), the marketplace of ideas has become increasingly competitive and think tanks, like interest groups, have sought to become more entrenched

in the policymaking process. For conservative think tanks, “this has meant devoting more time and resources to political advocacy [“and propaganda” (Smith, 1991, p.xvi)] than to policy research, a disturbing trend that has seriously undermined their ability to provide timely, sound, and meaningful policy expertise” (Abelson, 2005, p.327). They “place greater premium on links to the media, building networks within policy communities and tailoring their product to the needs of the decision-makers and opinion leaders” (Stone, 1996, p.23).

Tactics

According to Andrew Rich and R. Kent Weaver (2000), media visibility serves to influence policymakers, as they are known to pay attention to issues and ideas covered by the news media. Therefore, think tanks rely on the media visibility of their policy research and recommendations.

In her study of the mass media and American politics, Doris A. Graber observes that journalists rely extensively on personal networks and established contacts for information and that “sources who have gained recognition as ‘experts’ through media publicity tend to be used over and over again” (1993,112). Herbert J. Gans concurs in his study of network news and news organizations, observing that ‘staff and timing being in short supply, journalists actively pursue only a small number of regular sources who have been available and suitable in the past, and are passive toward other possible news sources (1980, 116). All of these considerations suggest that there may be scaled effects for think tanks in

obtaining media visibility, with larger think tanks receiving disproportionately greater media visibility than smaller ones.

These same potential biases might lead also to think tanks with research interests spanning a wide range of topics (e.g., both foreign and domestic policy) attracting disproportionately greater visibility than more specialized organizations of equal size. (Rich & Weaver, 2000, p.83)

Rich and Weaver's study found that the most important factors in think tank visibility in national newspapers are a think tank's budget size, a presence in Washington, D.C. and the biases and agendas of news outlets. Think tanks with the greatest budget sizes, the larger think tanks,

may receive disproportionately higher media visibility for several reasons: (1) because they are likely to be seen by busy reporters and editors as sources of 'one-stop shopping' for commentary, (2) because larger think tanks have the resources to publish and promote media guides that reporters and editors may use in soliciting comment for stories and editorials, and (3) because their very size can lead to greater familiarity with editors who are soliciting, or deciding whether to accept or reject, opinion pieces from think-tank staff whom they know personally. (Rich & Weaver, 2000, p.83)

A presence in Washington, D.C. also affects media visibility, seen most prominently in the *Washington Post*, since most reporting on national politics and policymaking is done by Washington-based reporters. Ideological biases and agendas of news outlets were also shown to affect media visibility, especially with ideologically

conservative think tanks in the *Washington Times* and *Wall Street Journal* and think tanks of no identifiable ideology in the *New York Times*. The researchers defined think tank ideology by an analysis of key words from their mission statements or from introductory statements in their annual reports (Rich & Weaver, 2000).

Michael Dolny of Fairness & Accuracy In Reporting (FAIR), a liberal media watch group, has surveyed think tank citations in the media for the last decade in order to study the media's use of experts to provide context for news events. Dolny relied on major newspaper articles and radio and TV transcript databases for his research.

His 2007 survey found that out of the 27,877 think tank citations, ideologically centrist think tanks receive 45 percent of all citations followed by ideologically conservative think tanks with 40 percent, trailed by ideologically progressive think tanks with 16 percent of total citations. The survey looked at a sample based on lists of think tanks generated by "political observers, notably the National Institute for Research Advancement (NIRA), Project Vote Smart and the University of Michigan library Political Science Resources list" (Dolny, 2007, p.2).

Ideological orientation was based on FAIR's evaluation of each think tank's published work, its leading personnel and media comments. The top five cited think tanks were the centrist Brookings Institution (3,896), the centrist Council on Foreign Relations (2,659), the conservative Heritage Foundation (2,384), the conservative American Enterprise Institute (2,267) and the conservative Center for Strategic and International Studies (1,950) (Dolny, 2007).

Manipulation

“As political theorist Göran Therborn has observed, there are three basic ways to keep people apathetic about a problem: (1) argue that it doesn’t exist; (2) argue that it is actually a good thing rather than a problem; or (3) argue that even if it is a problem, there is nothing they can do about it anyway” (Rampton & Stauber, 2001, p.272).

McCright and Dunlap (2000, 2003) argue that large conservative think tanks were so successful in arguing the *non-problematicity* of global warming throughout the 1990s that they were mostly responsible for the Kyoto Protocol’s rejection by the United States Senate in 1997. Conservative think tanks’ ideas were given a loud voice because of a change in the *Political Opportunity Structure* seen in the 1994 Republican takeover of Congress. Thanks to the change in POS, conservative think tanks and the skeptic scientists they supported were granted entrée to testify before Congress. These skeptic scientists, also used by the energy and automobile industries to question global warming science, testified more often than mainstream scientists and received nearly equal media coverage leading up to the Senate’s rejection of the Kyoto Protocol (McCright & Dunlap, 2003).

Think Tanks in Context

“The news media’s presentation of think tanks and the public’s possible lack of knowledge about think tanks from other sources together provide some evidence of the relationship between the news media and public understanding” (Haas, 2007, p.95).

“When a think tank representative is used as an expert on a topic, often that person’s media-framed credibility may be measured by the ideological label attached to

them. By failing to politically identify representatives of think tanks, or identify the financial base of think tanks, major media deprive their audiences of an important context for evaluating the opinions offered, implying that think tank ‘experts’ are neutral sources without any ideological predispositions” (Dolny, 1998-b, p.2).

Chapter III

Research Design

The researcher obtained a population from a convenience sampling of Rowan University undergraduate students. Subjects were undergraduate public relations and public relations/advertising majors in six classes: three instructed by Dr. Basso, one by Professor Hackney, one by Professor Litwin and one by Dr. Schoenstein. Each instructor allowed the researcher 10 to 15 minutes of class time to administer the research instruments.

Instruments

Quantitative research is a systematic and structured means of gathering and analyzing data. Quantitative research methods are used to “measure information about a population or database under study such as attitudes and opinions, newspaper clips, etc. and quantifying it (Bagin & Fulginiti, 2005, p.355).

Content Analysis

“Content analysis is a method of studying and analyzing communication in a systematic, objective, and quantitative manner for the purpose of measuring variables” (Dominick & Wimmer, 2003, p.141). A content analysis is a “discovery of information about a series of items through a systematic analysis resulting in factual statements, including frequencies and percentages of each item against selected categories or against

the whole” (Bagin & Fulginiti, 2005, p.349). “Content analysis relies on proper coding of each item and effective identification of categories. The technique does not answer *why* items are the way they are. It establishes only that they are that way” (Bagin & Fulginiti, 2005, p.67).

Those who perform content analysis look at the characteristics of communication messages. Their purpose is to learn something about the message content and about those who produced the messages. Their eventual interest might lie with the effects the content has on those who receive the message, that is, the audience. However, the researchers would need to link content analysis with another method, such as survey or experimental research, to address these effects. Researchers often subject speeches, news stories, and television programs to content analysis to learn about underlying attitudes, biases, or repeating themes. (Rubin, Rubin & Piele, 2005, p.225)

The researcher performed a content analysis on two national newspapers spanning April 15 and July 15, 2006, to gather information from all articles focusing on global warming. Articles were evaluated based on author affiliation, perceived stances of authors and the experts they cited on global warming issues (belief in global warming existence and belief of a scientific consensus on human-caused warming), scientific report citations and inclusion and perceived weight of opposing views.

The researcher enlisted two coders to analyze the articles. At least two coders are needed to ensure uniformity in the research process and in the research results. The content analysis was done to evaluate two hypotheses and two research questions: H1,

Global warming articles will be authored by think tank associates more often in the *Washington Times* than the *Washington Post*; H2, Most global warming articles discussing the existence of a scientific consensus found in the *Washington Post* will be of a balanced nature; i.e. give equal credence to experts on both sides of the consensus issue. R1, Are more think tank authored global warming articles found in conservative leaning newspapers than in liberal leaning newspapers? R2, Do the *Washington Post* and *Washington Times* allow competing viewpoints on global warming issues to be heard equally?

Experimental Research

“Experimental research focuses on people and behavior” (Rubin, et al., 2005, p.233). A controlled experiment is an “experiment that tests a hypothesis and controls variables” (Bagin & Fulginiti, 2005, p.349). “The controlled experiment is, when carried out properly, probably the most powerful method of seeking answers to research questions available to the behavioral scientist ... the controlled experiment is our best—and very nearly only—way of finding out what causes what” (Grunig & Hunt, 1984, p.186).

Using a pretest-posttest control-group experimental design with straightforward manipulation of variables, the researcher will survey subjects’ knowledge and attitudes regarding the perceived certainty of the scientific community on global warming. A treatment group will receive a *skeptic* article claiming that global warming is neither caused by man nor exists. A control group will receive an article espousing the majority view on global warming; that it exists and is caused by man.

The researcher will enlist two coders to tabulate the data. To analyze the data, researchers will use Microsoft Excel spreadsheets. The experimental research was done to evaluate three hypotheses and three research questions: H3, Most subjects will agree that global warming is caused by manmade greenhouse gas emissions; H4, Around half of the subjects will agree that there is a scientific consensus on the cause of global warming; H5, Subjects exposed to treatment showed more uncertainty concerning the scientific consensus on the cause of global warming than those in the control group. R3, How many subjects will agree that global warming is manmade? R4, How many subjects will agree that a scientific consensus exists on the cause of global warming? R5, Does context in articles on scientific controversy allow for better understanding of known scientific uncertainty?

Procedures

Content Analysis

Coders performed the content analysis on March 18 and 19, 2008. The *Washington Post* and the *Washington Times* were examined. Using the LexisNexis newspaper database, coders searched the three-month period surrounding the U.S. release of *An Inconvenient Truth*, April 15, 2006 through July 15, 2006 (IMDB, 2007). Each article was evaluated on three major categories: author affiliation, presence of “balance,” and presence of context.

Author affiliation was segmented into fifteen subcategories: environmental/science reporter, editorial staff, nationally syndicated columnist, Associate Press, ideologically conservative, liberal or centrist think tank/ public policy institute

member (ideological affiliation determined from think tank Web sites), climate scientist, other scientist, elected government official, appointed government official, industry advocate, environmental advocate, staff writer and other.

Presence of “balance” was segmented into nine subcategories: exclusive coverage of anthropogenic warming, anthropogenic contribution dominant, balanced accounts of anthropogenic contributions to warming, skepticism of anthropogenic contribution dominant; citation of mainstream scientists, citation of skeptic scientists; balanced accounts regarding ameliorative action, cautious/voluntary action dominant, immediate/mandatory action dominant (Boykoff & Boykoff, 2004).

Presence of context was segmented into x categories: (when scientific claims are made) relative acceptance of scientific view within scientific community given, relative acceptance of scientific view within scientific community not given, financial backing of report making scientific claim given, financial backing of report making scientific claim not given; (when think tank associates are cited or author an article) ideological slant of think tank given, ideological slant of think tank not given, financial backing of think tank given, financial backing of think tank not given.

Thirty-seven articles were examined from the *Washington Post* and 23 from the *Washington Times*.

Experimental Research

On March 10 and 12, 2008, the researcher conducted 103 controlled research experiments from a convenience sample of available students. Surveys were

administered to determine subject knowledge and attitudes about the scientific consensus on global warming existence and its manmade nature.

Fifty-one of the 103 subjects served as the treatment group while 52 served as the control group. The treatment group received an article on global warming denouncing it as hysteria that did not give contextual information regarding the relative scientific weight of the arguments and views discussed. The control group received an article on global warming giving context as to the relative scientific weight of arguments and views discussed.

Following exposure to the control and treatment instruments a post-test survey was administered to gauge any effects from the treatment article on attitudes or opinions.

Data Analysis

Coders will use Microsoft Excel to analyze the quantitative results from the content analysis and experimental research. A summary of the findings can be found in Chapter Four.

Primary research findings will help the researcher draw conclusions and develop recommendations for journalists, media consumers and public relations practitioners regarding controversial scientific issues – specifically, global warming.

CHAPTER IV

Results

Content Analysis

The researcher evaluated articles based on author affiliation, perceived stances on global warming issues: belief in global warming existence, belief of a scientific consensus on manmade warming; expert, document and event citations and inclusion and perceived weight of opposing views.

Two newspapers examined: the *Washington Post (Post)* and the *Washington Times (Times)*. Two coders searched the three-month period surrounding the U.S. release of *An Inconvenient Truth* on June 2, 2006 (IMDB, 2007) using the LexisNexis Academic newspaper database. The articles chosen for study were found using the search terms “global warming” and “climate change”. Only articles with a central focus on global warming were chosen. Articles reviewing *An Inconvenient Truth* or other climate change related entertainment were discarded.

Each article was evaluated on three major categories: author affiliation, presence of context and presence of *balance*. Article location and length were also recorded. The following are the content analysis findings.

Total articles:	<i>Post/Times</i> 37/23
Section:	<i>Post/Times</i>
National	15/10
Editorial/OpEd	14/8

Letters	2/5
Other	6/0

[Financial (4), Real Estate (1), Outlook (1)]

Page:	<i>Post/Times</i>
A1	4/2
A2-10	8/6
A11-20	11/12
A21-25	3/1
B1-5	1/2
B6-10	2/0
D1	4/0
F-5	1/0

Word count:	<i>Post/Times</i>
0-200	1/1
201-500	9/8
501-750	12/9
750-1000	10/2
1001-1500	4/0
1500-2000	0/1
2000+	1/0

Author affiliation:
(as identified in the articles)

	<i>Post/Times</i>
Staff writer	17/10
Other**	9/4
Editorial staff	7/4
Government official	
- Appointed	4*/0
- Elected	0/0
Scientist	
- Climate	2/3*
- Non-climate	0/0
Think tank associate	
- Centrist	0/2*
- Conservative	0/2
- Liberal	0/0
Advocate	
- Environmental	1*/0
- Industry	0/0
Syndicated columnist	1/0
Associated Press	0/0
Environmental/ Science reporter	0/0

*One author from the *Post* was listed as both an appointed government official and an environmental activist in one article; one author from the *Times* was listed as both a climate scientist and an associate of a centrist think tank in two articles.

**Other authors for the *Post* were: *Washington Post* Foreign Service writer (3), a professor of law and political science at University of Chicago (1), a scholar-in-residence at Middlebury College (1), a University of Maryland professor of architecture (1), and two non-descript letter writers (2). Other authors for the *Times* were: four non-descript letter writers (4).

Scientist citations*:

(as identified in the articles)

	<i>Post/Times</i>
“Manmade”	23/9
Non-climate scientist	2/1
“Natural”	1/2
“Predictions not exaggerated”	1/3
“Predictions exaggerated”	0/3

*“Manmade” refers to the scientist’s belief in manmade global warming, “Natural” refers to belief in naturally occurring global warming, “Predictions...” refers to those scientists whose beliefs were not cited, but whose stances on global warming predictions were.

Scientist affiliation:

(as identified in the articles)

	<i>Post/Times</i>
University	17/11
- U.S.	17/7
- other	0/4
Government agency	10/6
- U.S.	9/5
- other	1/1
Not given	0/3

Government official citations:

(as identified in the articles)

	<i>Post/Times</i>
Elected	13/5
Appointed	2/2

Government official belief citations:

(as identified in the articles)

	<i>Post/Times</i>
Manmade	8/2
Natural	7/0
Not given	3/2

Advocate citations:

(as identified in the articles)

	<i>Post/Times</i>
Environmental	9/1
Industry	6/1

Think tank associate citations:

	<i>Post/Times</i>
Centrist	0/0
Conservative	3/6
Liberal	4/0

Think tank ideology cited:

	<i>Post/Times</i>
Cited	0/0
Not cited	7/6

Think tank financial backing cited:

	<i>Post/Times</i>
Cited	2/0
Not cited	5/6

Research documents cited:

	<i>Post/Times</i>
“Manmade”	
- no title given	10/7
- title given	1/0
“Natural”	
- no title given	0/0
- title given	0/0
Non-climate report	2/0

Al Gore cited:

	<i>Post/Times</i>
Negative	1/9
Positive	4/0
Neutral	2/1

An Inconvenient Truth cited:

	<i>Post/Times</i>
Negative	0/6
Positive	4/0
Neutral	4/1

Relative scientific acceptance of view cited:

	<i>Post/Times</i>
“Manmade”	
- Cited	6/2
- Not cited	31/21
“Natural”	
- Cited	1/2
- Not cited	36/21

Overall global warming coverage:

	<i>Post/Times</i>
“Manmade”	
- Exclusive	18/2
- Dominant	13/0
Balanced	2/1
“Natural”	
- Exclusive	0/1
- Dominant	0/15
Not directly addressed	4/4

Experimental Research

Using a pretest-posttest control-group experimental design with straightforward manipulation of variables, the researcher surveyed subjects' knowledge and attitudes regarding global warming. A treatment group received an article claiming that global warming is neither caused by man, nor exists. This article was taken from the *Times* and was authored by a conservative think tank associate. A control group received an article espousing the scientific majority view on global warming: that it exists and is caused by man. This article was written by a *Post* staff writer.

Both articles discussed the findings of the Arctic Climate Impact Assessment that warned of the possible global warming-related extinction of polar bears. One hundred and three sets of confidential surveys were completed in five classes between March 10 and 12, 2008. The following are the pre-test findings.

1. Circle the statement that **BEST** represents your views on global warming.
- 0 a) Global warming is a fallacy.
 - 10 b) I am not certain, but global warming is probably a fallacy.
 - 31 c) Global warming is an area that needs more research before I can decide.
 - 28 d) I am not certain, but global warming is probably real.
 - 34 e) Global warming is real.

Answer #2 ONLY if you answered “Global warming is a fallacy” or “I am not certain, but global warming is probably a fallacy” to #1.

2. Circle the statement that **BEST** explains your views on global warming.
- 13 a) Environmentalist hysteria: much like global cooling, global warming is a gross exaggeration of what is actually known.
 - 2 b) Grant money: scientists study what will keep them employed.
 - 0 c) Political conspiracy: organizations like the United Nations, European Union and the Council on Foreign Relations want to sap powerful nations’ sovereignty to create a one world government.
 - 6 d) Not sure.
 - 0 e) Other, please specify:
3. Circle the statement that **BEST** explains global warming.
- 29 a) Natural climate variation: we are at a high point in the Earth’s natural climate cycle.
 - 2 b) The sun: orbital eccentricities of the Earth and variations in the sun’s output.
 - 53 c) Human activity: emissions from burning fossil fuels like coal and oil have created an enhanced greenhouse effect.
 - 15 d) Not sure.
 - 5 e) Other, please specify: _____.
 - 6 some combination of a, b and c
4. Based on what is known today, circle the statement that **MOST** accurately reflects your view of when, if ever, the effects of global warming will begin to happen?
- 1 a) They will never happen.
 - 70 b) They have already begun.
 - 2 c) They will start happening within a few years.
 - 17 d) They will start happening within my lifetime.
 - 13 e) They will no not happen within my lifetime, but will effect future generations.

5. Which one of the following statements do you think is **MOST** accurate?
- 46 a) Most scientists agree that global warming is occurring.
 2 b) Most scientists believe that global warming is not occurring.
 38 c) Most scientists disagree about whether global warming is occurring or not.
 17 d) Don't know.
6. Which one of the following statements do you think is **MOST** accurate?
- 12 a) Most scientists believe that global warming is a natural phenomenon.
 54 b) Most scientists believe that global warming is manmade.
 15 c) Most scientists are unsure about what causes global warming.
 1 d) Most scientists believe that global warming is not occurring.
 21 e) Don't know.
7. Thinking about what is said in the news, in your view, the depiction of global warming seriousness is:
- 44 a) Generally exaggerated.
 23 b) Generally correct.
 22 c) Generally underestimated.
 1 d) The depiction is inaccurate because global warming is not a real issue.
 13 e) Don't know.
8. Are you familiar with the peer review process?
- 35 a) Yes.
 68 b) No.

Answer #9 ONLY if you answered "Yes" to #8.

9. Have you ever read a peer reviewed journal article?
- 30 a) Yes.
 5 b) No.
10. Have you read Michael Chrichton's 2004 novel *State of Fear*?
- 1 a) Yes.
 51 b) No.
 51 c) No, never heard of it.

Answer #11 ONLY if you answered “No” to #10.

11. Would you **CONSIDER** reading it if you had the time?

- 48 a) Yes.
34 b) No.

12. Have you seen and/or read Al Gore’s 2006 documentary/book *An Inconvenient Truth*?

- 34 a) Yes.
69 b) No.

Answer #13 ONLY if you answered “No” to #12.

13. If **No**, would you **CONSIDER** seeing and/or reading it if you had the time?

- 40 a) Yes.
24 b) No.

For the following statements, circle the number that **BEST** represents your views.

1 = Strongly disagree; 7 = Strongly agree

14. I understand how the Earth’s climate system works.

- | | | | | | | |
|------|------|-----|-----|-----|-----|-----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| (53) | (50) | (-) | (-) | (-) | (-) | (-) |

15. I understand the political implications of global warming.

- | | | | | | | |
|-----|------|------|------|------|-----|-----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| (5) | (19) | (22) | (28) | (22) | (5) | (2) |

16. I have faith in the peer review process to produce unbiased, reliable work.

- | | | | | | | |
|-----|-----|------|------|-----|-----|-----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| (7) | (9) | (12) | (54) | (7) | (7) | (1) |

17. Generally, I trust what a majority of experts in their respective fields say about issues related to their fields of expertise.

- | | | | | | | |
|------|------|------|------|------|-----|-----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| (10) | (21) | (27) | (22) | (15) | (8) | (-) |

Demographics

18. You are.
- 35 a) Male.
68 b) Female.
19. Circle your age group.
- 6 a) 18-19.
53 b) 20-21.
33 c) 22-23.
11 d) 24 or older.
20. Where do you get **MOST** of your information about global warming?
- 75 a) TV: broadcast and/or cable news programs.
10 b) Daily newspapers: print and/or electronic.
3 c) Magazines: weekly and/or monthly.
0 d) Radio: news and/or talk radio.
2 e) Blogs.
13 f) Other source, please specify: _____.
- 4 – Professors/classes
4 – Internet
2 – Word of mouth
3 – Combinations of a, b, c, d and e.
21. Which term **BEST** summarizes your political views.
- 9 a) Conservative.
13 b) Moderate conservative.
28 c) Moderate.
29 d) Moderate liberal.
22 e) Liberal.
- 2 – “none”

After completing the pre-test survey, subjects read one of two articles. Subjects either read a *skeptic* treatment article, “Art. 1”, or a control article, “Art. 2” (See *Appendices C and D*).

For the following statements, circle the number that **BEST** represents your views.
1 = Strongly disagree; 7 = Strongly agree

1. Global warming is man-made.

	1	2	3	4	5	6	7
Total:	(4)	(11)	(15)	(21)	(27)	(20)	(5)
Art. 1:	(2)	(7)	(8)	(10)	(11)	(11)	(1)
Art. 2:	(2)	(4)	(7)	(11)	(16)	(9)	(4)

2. Global warming is a natural phenomenon.

	1	2	3	4	5	6	7
Total:	(7)	(12)	(16)	(24)	(22)	(18)	(4)
Art. 1:	(0)	(6)	(9)	(11)	(14)	(9)	(2)
Art. 2:	(7)	(6)	(7)	(13)	(8)	(9)	(2)

3. The article I just read conveyed certainty that global warming is man-made.

	1	2	3	4	5	6	7	No response.
Total:	(8)	(18)	(10)	(28)	(14)	(16)	(7)	(2)
Art. 1:	(6)	(11)	(6)	(14)	(5)	(6)	(1)	(2)
Art. 2:	(2)	(7)	(4)	(14)	(9)	(10)	(6)	(-)

4. The article I just read conveyed certainty that global warming is a natural phenomenon.

	1	2	3	4	5	6	7	No response.
Total:	(7)	(18)	(11)	(28)	(18)	(13)	(7)	(1)
Art. 1:	(-)	(6)	(7)	(11)	(9)	(12)	(5)	(1)
Art. 2:	(7)	(12)	(4)	(17)	(9)	(1)	(2)	(-)

5. I am certain that in the next 100 years, because of melting ice caused by global warming, polar bears will be nearly or entirely extinct.

	1	2	3	4	5	6	7	No response.
Total:	(6)	(16)	(10)	(18)	(19)	(23)	(10)	(1)
Art. 1:	(4)	(9)	(5)	(9)	(10)	(8)	(5)	(1)
Art. 2:	(-)	(1)	(2)	(6)	(12)	(22)	(9)	(-)

6. The message of the article I just read conveyed certainty about polar bears' chances of going extinct in the next 100 years.

	1	2	3	4	5	6	7	No response.
Total:	(8)	(8)	(10)	(18)	(19)	(27)	(12)	(1)
Art. 1:	(8)	(7)	(8)	(12)	(7)	(5)	(3)	(1)
Art. 2:	(-)	(1)	(2)	(6)	(12)	(22)	(9)	(-)

7. Which one of the following statements do you think is **MOST** accurate?

	Total	Art. 1	Art. 2
a) Most scientists believe that global warming is a natural phenomenon.	13	9	4
b) Most scientists believe that global warming is manmade.	47	17	30
c) Most scientists are unsure about what causes global warming.	22	12	10
d) Most scientists believe that global warming is not occurring.	1	0	1
e) Don't know.	19	12	7
	1	1	0

CHAPTER V

Interpretation and Suggestions

Evaluation

The purpose of this study is to determine the influence of think tanks on public understanding of manmade global warming. More specifically, this study seeks to identify a news media bias in global warming coverage through context omission and the effects of biased coverage on media consumers' understanding of scientific issues. The research findings will serve to make journalists and editors more aware of the need for context in reporting on scientific issues like global warming. The findings will also serve to make readers more aware of the potential for biased, inaccurate information in the news media. Finally, the findings will serve to make public relations practitioners more aware of the power of third-party testimonials and the potential for their abuse and the possibility of damaged stakeholder relationships.

Interpretation

Content Analysis

Hypothesis 1. Global warming articles authored by think tank associates will occur more often in the *Washington Times* than in the *Washington Post*.

The researcher found that out of 37 *Washington Post* articles and 23 *Washington Times* articles dealing exclusively with global warming, only four were authored by think tank associates. All four were in the *Washington Times*.

The following is a breakdown of author affiliation for all the articles.

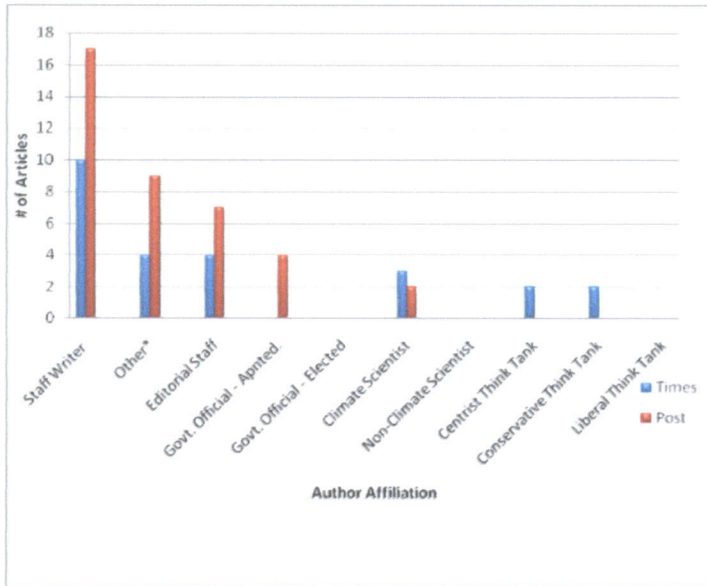


Figure 5. Author affiliation.

Research Question 1. Are more think tank authored global warming articles found in conservative-leaning newspapers than in liberal-leaning newspapers?

In reference to the three-month time period analyzed, the conservative-leaning *Washington Times* had more think tank authored global warming articles than the liberal-leaning *Washington Post*. Such a small sample size makes generalizing the authorship of global warming articles in all conservative- and liberal-leaning newspapers difficult.

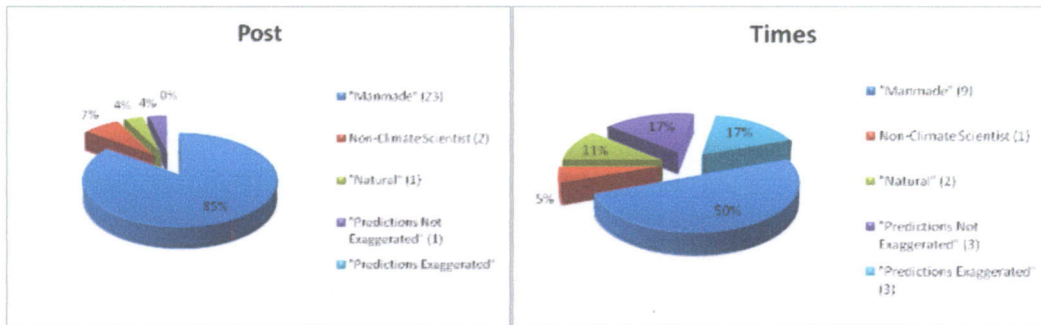
Hypothesis 2. Most global warming articles discussing the existence of a scientific consensus found in the *Washington Post* will be of a balanced nature; i.e. give equal credence to experts on both sides of the consensus issue.

To measure *balance* the researcher analyzed: expert citations, citations of research documents, references to Al Gore and *An Inconvenient Truth*, the relative scientific

acceptance of global warming views in each article, and, most importantly, the overall tone of each article regarding man's influence on global warming.

Expert citations

Scientists:



Figures 6 & 7. Scientist citations.

The *Post's* overall scientist citations do not give equal credence to scientists of differing viewpoints.

Government officials:

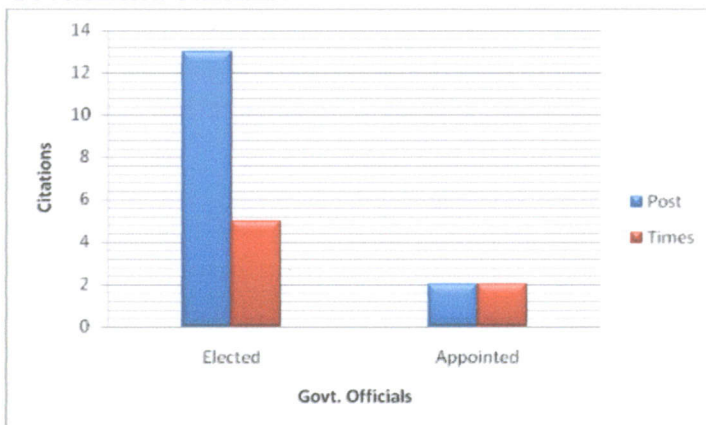


Figure 8. Government official citations.

Government officials' beliefs:

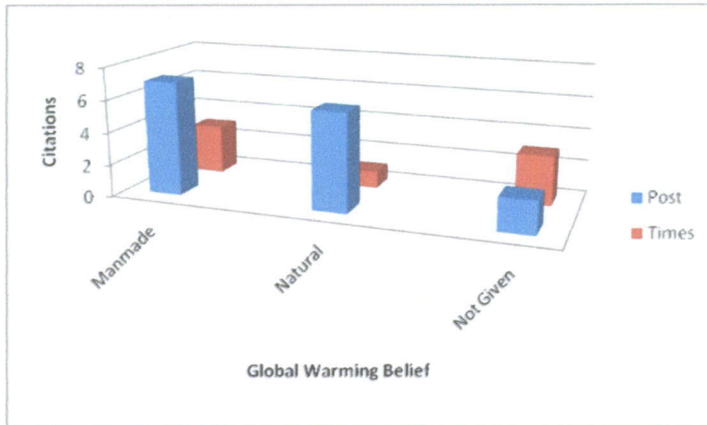


Figure 9. Government official belief citations.

The *Post*'s overall government official citations are nearly balanced with seven officials with beliefs in manmade- and six with beliefs in natural-global warming.

Advocates:

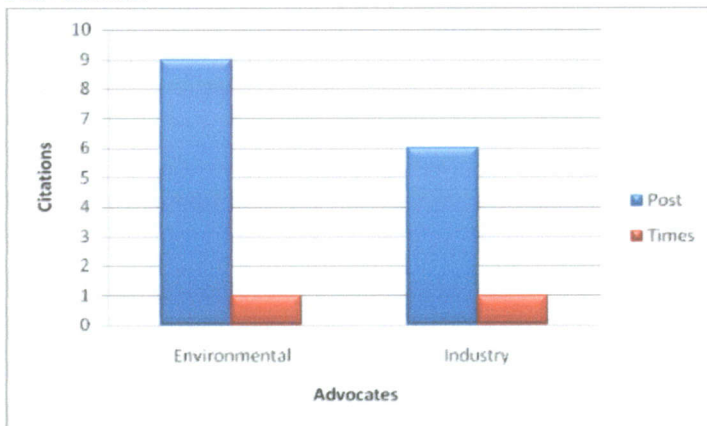


Figure 10. Advocate citations.

The *Post*'s overall advocate citations are nearly balanced with nine environmental advocates and six industry advocates cited.

Think tank associates:

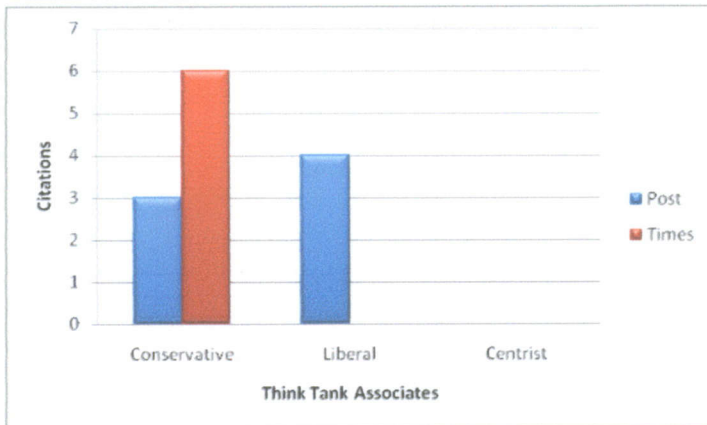


Figure 11. Think tank associate citations.

The *Post*'s overall think tank associate citations are nearly balanced with three conservative and four liberal think tank associates cited.

Research documents:

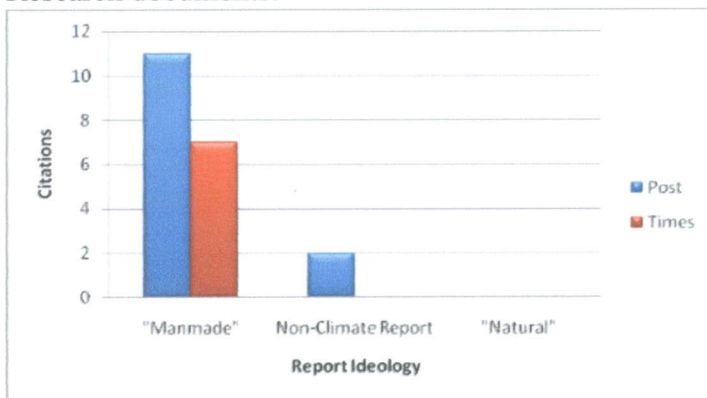


Figure 12. Research document citations.

The *Post*'s overall research document citations are biased in favor of manmade global warming reports.

Al Gore and *An Inconvenient Truth*:

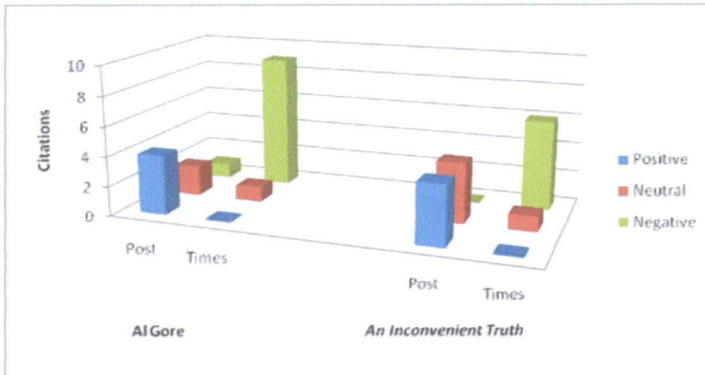


Figure 13. *Al Gore and An Inconvenient Truth* citations.

The *Post*'s overall coverage of Al Gore and *An Inconvenient Truth* lean heavily toward positive references.

Relative acceptance of global warming views:

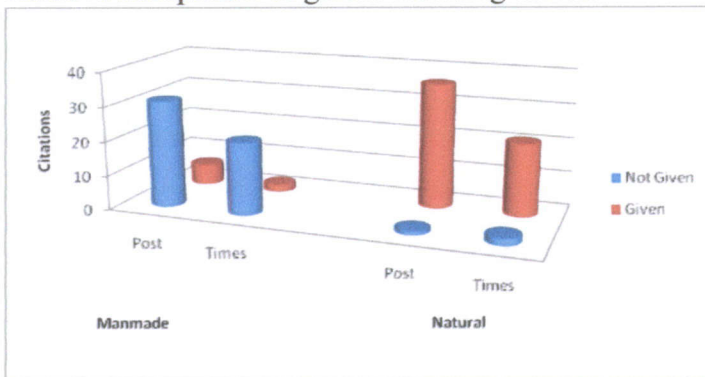


Figure 14. *Relative scientific acceptance of global warming view citations.*

The *Post*'s overall coverage of the relative acceptance of views given in their articles is biased toward the natural global warming view. When a *Post* article cited the natural view, it let its readers know that it did not have the support of a majority of scientists. When a *Post* article cited the manmade view, it did not let its readers know how a majority of scientists felt in all but six citations.

Overall article tone:

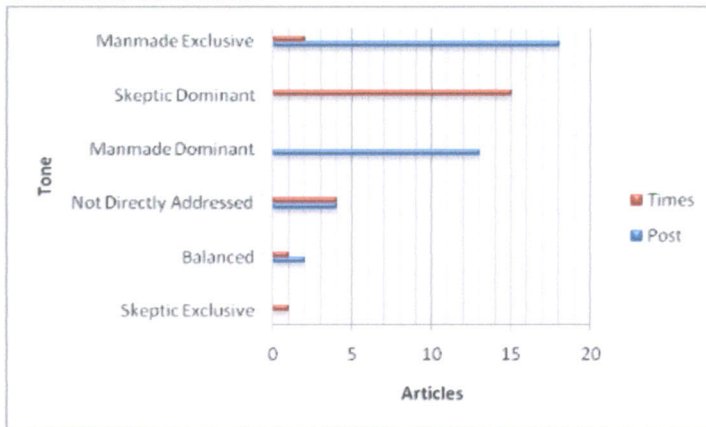


Figure 15. Article tone.

The *Post*'s overall coverage was biased toward the manmade global warming view. Eighteen articles had an exclusively *manmade* tone, 13 articles were dominantly of a *manmade* tone and only two had tones that gave a balanced view of the *manmade* and *natural* views.

Research Question 2. Does the *Washington Post*, a liberal-leaning newspaper, allow competing viewpoints on global warming to be heard equally?

No. From the sample analyzed, the *Post* seems to be heavily biased toward the “manmade global warming” viewpoint. While Boykoff and Boykoff (2004) argued that the mere presence of competing viewpoints connotes a *bias* of balance, this study analyzed the context of each expert’s voice, concluding that no such balance exists overall.

Experimental Research

Hypothesis 3. Most subjects will agree that global warming is caused by manmade greenhouse gas emissions.

Findings from the pre-test survey of all 103 subjects show that a majority (53) believe global warming to be a manmade phenomenon.

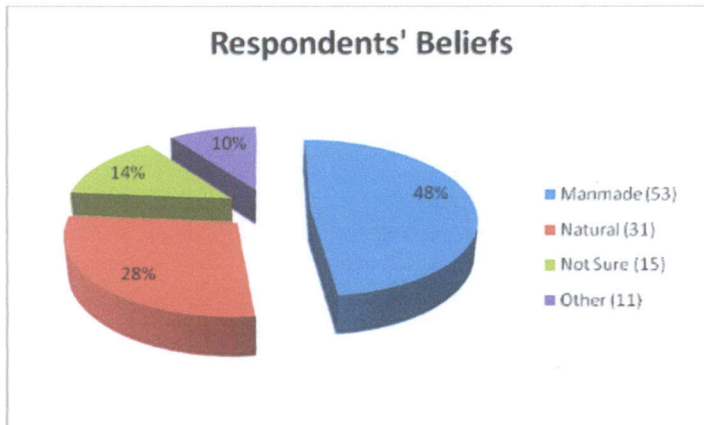


Figure 16. Respondents' beliefs.

R3 How many subjects will agree that global warming is manmade?

Fifty-three subjects showed that they believe global warming to be a manmade phenomenon. However, 28 percent believe global warming is caused naturally.

Hypothesis 4. More than half of the subjects will agree that there is a scientific consensus on the cause of global warming.

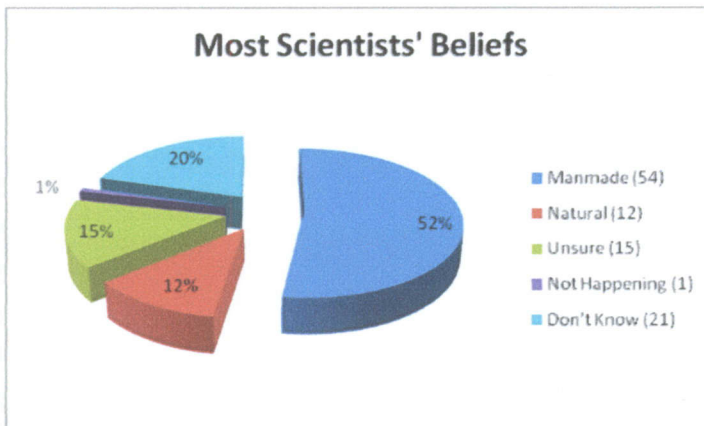


Figure 17. Most scientists' beliefs.

More than half of the subjects agreed that there is a scientific consensus on the cause of global warming.

Research Question 4. How many subjects will agree that a scientific consensus exists on the main cause of global warming?

Fifty-four of the 103 subjects believe that a scientific consensus on the manmade nature of global warming exists.

Hypothesis 5. Subjects exposed to treatment will show more uncertainty concerning the scientific consensus on the cause of global warming than those in the control group.

Of the subjects exposed to the treatment article, those who changed their responses (from the pre-test question 6 to the post-test question 7) changed them away from the scientific consensus on manmade global warming to no consensus (*unsure*) or a consensus on *natural* global warming.

Findings from subjects who read article 1, the *skeptical* article:

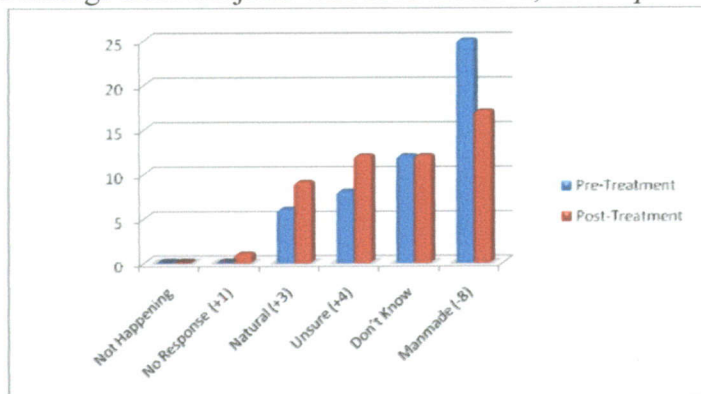


Figure 18. *Skeptical article treatment.*

Findings from subjects who read article 2, the control article:

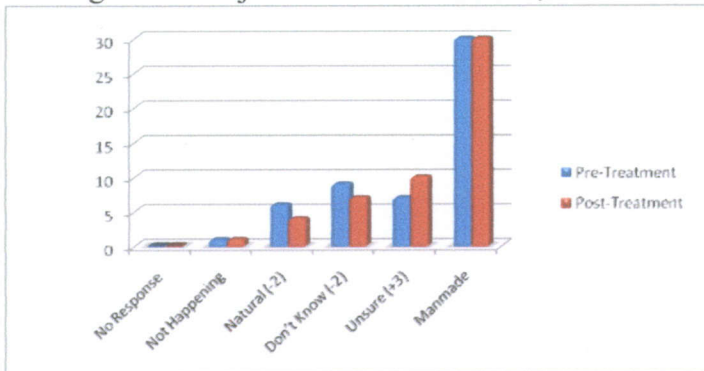


Figure 19. Control article treatment.

Research Question 5. Does context in articles on scientific controversy allow for better understanding of known scientific uncertainty?

Assuming the Intergovernmental Panel on Climate Control, the Royal Society and the National Academy of Science truly represent an overwhelming international scientific consensus on the manmade nature of global warming, articles with context allow for a better understanding of known scientific uncertainty pertaining to global warming. Subjects in the treatment group who received the *skeptic* article showed greater uncertainty and a move toward the *natural* belief.

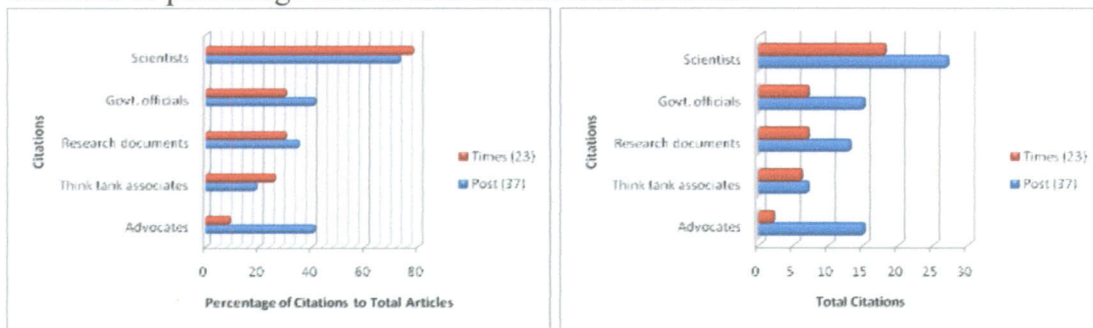
Subjects in the control group who received the context article showed less uncertainty (two subjects moved away from the *Don't Know* answer) and none moved away from the *manmade* belief, in aggregate.

Conclusions

Findings from the content analysis suggest that global warming coverage is dependent on newspaper ideology and findings from the experimental research suggest that context in global warming articles aids reader understanding.

The *Washington Post* and *Washington Times* were found to be biased toward manmade and natural explanations for global warming, respectively. The *Post*, however, provided more context in the form of expert and document citations (see Figures 20 & 21). The *Times* cited more overall scientists and think tank associates, while the *Post* cited more government officials, advocates and research documents to support its arguments.

Citations as percentage of total articles and total citations:



Figures 20 & 21: Citation percentages and totals.

Experimental research findings suggest that subjects in the control group were more certain than those in the treatment group. Because *Article 2*, given to the control group, contained context about the scientific acceptance of the manmade global warming view, subjects mostly maintained the same responses (see Figure 19). Because *Article 1*, given to the treatment group, had less context about the scientific acceptance of the manmade global warming view, subjects changed more of their responses (see Figure 18).

Contribution to the Field

Based on the above findings, the researcher found that journalists, editors, news media consumers and public relations practitioners could benefit from recognizing the impact of context in communications dealing with confusing issues.

Journalists and editors not already making an effort to provide context in reporting scientific controversies should make an effort to do so. News media consumers should be more aware of the *balance bias* in controversial scientific issues stemming from journalists and editors seeking to provide a superficial balance. Public relations practitioners will confirm their knowledge of the power of third-party influential and the two-step flow process of communications laundering.

Further Research

The researcher has several suggestions for further research on the use of context in news media communications concerning global warming and the affect of context on news media consumers:

- Conduct content analysis of broader period of time of more news papers and of news radio and television news transcripts.
- Conduct experimental research of a larger, scientifically selected population representative of the United States.
- Conduct a content analysis of scientifically selected universe of all published research on climate change to update and expand Naomi Oreskes' 2004 study.
- Update McCright and Dunlap's 2003 study of think tank influence in carbon regulation policy by way of media visibility, skeptic scientist placement on Congressional committee panels and skeptic scientist placement elsewhere.

Further research in these areas will more conclusively display the positive correlation between communication context and reader understanding, the scientific

consensus on manmade global warming and the influence of think tanks on skeptic
scientist visibility in the news media.

References

- Abelson, D. E. (2005, Summer). Think tanks, public policy, and the politics of expertise. *Political Science Quarterly*, 120(2), 326-328. Retrieved October 9, 2007, from Academic Search Premier database.
- . (2002). *Do think tanks matter? assessing the impact of public policy institutes*. Montreal, Kingston, London, Ithaca: McGill-Queen's University Press.
- Armitage, K. (2005, December). State of Denial: the United States and the politics of global warming. *Globalizations*, 2(3), 417-427. Retrieved October 6, 2007, from Academic Search Premier database.
- Ball, J. (2007, January 11). Exxon softens climate-change stance; hoping to shape policy, oil giant joins dialogue on curbing of emissions. *The Wall Street Journal*. Retrieved March 27, 2008, from ProQuest database.
- Béland, D. (2005, Winter). Politics of ideas. *Review of Politics*, 67(1), 183-185. Retrieved October 9, 2007, from Academic Search Premier database.
- Boykoff, M. T., & Boykoff, J. M. (2004, July). Balance as bias: global warming and the US prestige press. *Global Environmental Change*, 14(2), 125-136. Retrieved November 4, 2007, from <http://www.sciencedirect.com>.
- Chong, D., & Druckman, J. (2007). Framing theory. *Annual Review of Political Science*, 10(1), 103-126. Retrieved October 9, 2007, from Academic Search Premier database.
- Corbett, J. B., & Durfee, J. L. (2004, December). Testing public (un)certainly of science: media representations of global warming. *Science Communication*, 26(2), 129-151. Retrieved October 16, 2007, from SAGE Journals Online database.

- Cushman, J. H. Jr. (1998, April 26). Industrial group plans to battle climate treaty. *The New York Times*. Retrieved November 5, 2007, from <http://www.nytimes.com>.
- Dolny, M. (2007, March-April). Think tank sources fall, but Left gains slightly; Progressive groups still a small slice. *Extra!* Retrieved October 14, 2007 from <http://www.fair.org>.
- . (1998-a, August). Global smokescreen. *Extra!* Retrieved November 2, 2007, from <http://www.fair.org>.
- . (1998-b, May/June). What's in a label? right-wing think tanks are often quoted, rarely labeled. *Extra!* Retrieved November 2, 2007, from <http://www.fair.org>.
- Dunwoody, S. (1999). Scientists, journalists and the meaning of uncertainty. 72. In *Communicating uncertainty: media coverage of new and controversial science*. Ed. Friedman, S., Dunwoody, S., Rogers, C. L. Mahwah, New Jersey: Lawrence Erlbaum Associates, Publishers.
- Entman, R. M. (1993, Autumn). Framing: toward clarification of a fractured paradigm. *Journal of Communication*, 43(4), 51-58.
- Fisher, D. R. (2006). Bringing the material back in: understanding the US position on climate change. *Sociological Forum*, 21(3), 467-494. Retrieved November 4, 2007, from <http://www.springerlink.com>.
- Gamson, W. (1999, January). Beyond the science-versus-advocacy distinction. *Contemporary Sociology*, 28(1), 23-26. Retrieved November 7, 2007, from JSTOR database.
- Gelbspan, R. (1998). *The heat is on: the climate crisis, the cover-up, the prescription* (2nd ed.). Cambridge, Massachusetts: Perseus Books.

- Grunig, J.E., & Hunt, T. (1984). *Managing public relations*. New York: CBS College Publishing.
- Haas, E. (2007). False equivalency: think tank references on education in the news media. *Peabody Journal of Education*, 82(1), 63-102. Retrieved October 9, 2007, from Academic Search Premier database.
- Heath, R. L., & Bowen, S. A. (2002, July). The public relations philosophy of John W. Hill: bricks in the foundation of issues management. *Journal of Public Affairs*, 2(4), 230-246. Retrieved March, 5, 2008, from Academic Search Premier database.
- House, D. (2003, August). Shaping public policy and opinion. *Science & Public Policy (SPP)*, 30(4), 298-299. Retrieved October 9, 2007, from Academic Search Premier database.
- IPCC. (2007-a). Summary for policymakers. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge, United Kingdom and New York, NY, USA: Cambridge University Press. Retrieved November 9, 2007, from <http://www.ipcc.ch>.
- . (2007-b). *About IPCC*. Retrieved December 17, 2007, from <http://www.ipcc.ch>.
- . (2004, December). 16 years of scientific assessment in support of the climate convention. Retrieved December 17, 2007, from <http://www.ipcc.ch>.
- Keeling, C.D., Piper, S.C., Bacastow, R.B., Wahlen, M., Whorf, T.P., Heimann, M., & Meijer, H.A. (2005). Atmospheric CO₂ and ¹³CO₂ exchange with the terrestrial

biosphere and oceans from 1978 to 2000: observations and carbon cycle implications, pages 83-113, in "A History of Atmospheric CO₂ and its effects on Plants, Animals, and Ecosystems", eds, Ehleringer, J.R., T. E. Cerling, M. D. Dearing, Springer Verlag: New York. Retrieved December 16, 2007, from <http://scrippsco2.ucsd.edu>.

Krosnick, J.A., Holbrook, A.L., & Visser, P.S. (2000). The impact of the fall 1997 debate about global warming on American public opinion. *Public Understanding of Science* 9, 239-260. Retrieved December 16, 2007, from <http://pus.sagepub.com>.

Leggett, J. (2001). *Carbon war, The*. New York: Routledge.

McCright, A., & Dunlap, R. (2003, August). Defeating Kyoto: the Conservative movement's impact on U.S. climate change policy. *Social Problems*, 50(3), 348. Retrieved October 9, 2007, from Academic Search Premier database.

---. (2000). Challenging global warming as a social problem: an analysis of the conservative movement's counter-claims. *Social Problems*, 47(4), 499-522.

Mooney, C. (2005-a). *Republican war on science, The*. New York: Basic Books.

---. (2005-b, May/June). Some like it hot. *MotherJones.com*. Retrieved November 6, 2007, from <http://www.motherjones.com>.

---. (2004, November). Blinded by science: how 'balanced' coverage lets the scientific fringe hijack reality. *Columbia Journalism Review*, 43(4), 26-35. Retrieved November 9, 2007, from Communication & Mass Media Complete database.

Moser, S., & Dilling, L. (2004, December). Making climate hot: communicating the urgency and challenge of global climate change. *Environment*, 46(10), 32-46. Retrieved November 4, 2007, from Academic Search Premier database.

- National Academy of Science. (2007). *About the NAS*. Retrieved December 17, 2007, from <http://www.nasonline.org>.
- National Academy of Sciences. (2001). *Climate change science: an analysis of some key questions*. Committee on the Science of Climate Change, National Research Council. National Academy Press: Washington, D.C. Retrieved November 18, 2007, from <http://www.nap.edu/>.
- Nelkin, D. (1987). *Selling science: how the press covers science and technology*. New York: W.H. Freeman & Company.
- Nisbet, M., & Myers, T. (2007, Fall). The polls—trends: twenty years of public opinion about global warming. *Public Opinion Quarterly*, 71(3), 444-470. Retrieved October 9, 2007, from Academic Search Premier database.
- Oreskes, N. (2004). The scientific consensus on climate change. *Science*, 306. Retrieved October 30, 2007, from <http://www.sciencemag.org>.
- Pew Center on Global Climate Change (a). *Climate change 101: the science and impacts*. Retrieved December 15, 2007, from <http://www.pewclimate.org>.
- (b). *Full Glossary*. Retrieved November 4, 2007, from <http://www.pewclimate.org>.
- Pew Research Center For the People & The Press, The. (2007, Jan. 24). *Global warming: a divide on causes and solutions: public views unchanged by unusual weather*, news release. Retrieved November 16, 2007, from <http://pewresearch.org>.
- Rampton, S., & Stauber, J. (2001). *Trust us, we're experts! how industry manipulates science and gambles with your future*. New York: Penguin Putnam, Inc.

- Rich, A. (2005). *Think tanks, public policy, and the politics of expertise*. Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore, São Paulo: Cambridge University Press.
- Rich, A., & Weaver, R. (2000, Fall). Think tanks in the U.S. media. *Harvard International Journal of Press/Politics*, 5(4), 81. Retrieved October 9, 2007, from Academic Search Premier database.
- Rowan, K.E. (1999). Effective Explanation of uncertain and complex science. 207. In *Communicating uncertainty: media coverage of new and controversial science*. Ed. Friedman, S., Dunwoody, S., Rogers, C. L. Mahwah, New Jersey: Lawrence Erlbaum Associates, Publishers.
- Royal Society, The. (2005). *A guide to facts and fictions about climate change*. Retrieved December 17, 2007, from <http://royalsociety.org>.
- Scheufele, D., & Tewksbury, D. (2007, March). Framing, agenda setting, and priming: the evolution of three media effects models. *Journal of Communication*, 57(1), 9-20. Retrieved October 16, 2007, from Communication & Mass Media Complete database.
- Scripps CO2 Program. (2007). *CO2 concentration at Mauna Lua observatory, Hawaii*. Retrieved December 16, 2007, from <http://scrippsco2.ucsd.edu>.
- Smith, J. A. (1991). *The idea brokers: think tanks and the rise of the new policy elite*. New York: The Free Press.
- Sterman, J.D., & Sweeney, L.B. (2007, Feb.). Understanding public complacency about climate change: adults' mental models of climate change violate conservation of

- matter. *Climate Change*, 80(3/4), 213-238. Retrieved March 9, 2008, from <http://web.mit.edu/jsterman/www/StermanSweeney.pdf>.
- Stocking, S., & Holstein, L (2006). Manufacturing doubt: journalists' roles and the construction of ignorance in a scientific controversy. *Conference Papers – International Communication Association*, Retrieved November 2, 2007, from Communication & Mass Media Complete database.
- Timmons, H. (2006, Sept. 20). British group says Exxon misrepresents climate. *The New York Times*. Retrieved March 27, 2008, from <http://www.nytimes.com>.
- Toman, M. A., ed. (2001). Climate Change Economics and Policy. Washington, DC: RFF Press.
- Ungar, S. (2000). Knowledge, ignorance and the popular culture: climate change versus the ozone hole. *Public Understanding of Science* 9, 297-312. Retrieved December 16, 2007, from <http://pus.sagepub.com>.
- Western Fuels Association, Inc. (2007). *Home*. Retrieved December 17, 2007, from <http://www.westernfuels.org>.
- Wilson, K.M. (2000). Drought, debate, and uncertainty: measuring reporters' knowledge and ignorance about climate change. *Public Understanding of Science*, 9, 1-13. Retrieved December 16, 2007, from <http://pus.sagepub.com>.
- WMO, (World Meteorological Organization) (2007). *World climate conference-3: history*. Retrieved December 17, 2007, from <http://www.wmo.ch>.
- Zehr, S.C., (1999). *Scientists' representations of uncertainty*. 4. In *Communicating uncertainty: media coverage of new and controversial science*. Ed. Friedman, S.,

Dunwoody, S., Rogers, C. L. Mahwah, New Jersey: Lawrence Erlbaum
Associates, Publishers.

Appendix A: Content Analysis – Coding Sheet

Newspaper:

- 1 – *Washington Post*
- 2 – *Washington Times*

Section:

- 1 – National
- 2 – Science/ Environment
- 3 – Editorial/ OpEd
- 4 – Letters
- 5 – Local
- 7 – International
- 8 – Other

Page:

- 1 – A1
- 2 – A2-10
- 3 – A11-20
- 4 – A21-25
- 5 – B1-5
- 6 – B6-10
- 7 – D1
- 8 – F-5

Word Count:

- 1 – 0-200
- 2 – 201-500
- 3 – 501-750
- 4 – 750-1000
- 5 – 1001-1500
- 6 – 1500-2000
- 7 – 2000+

Author:

- 1 – environmental/science reporter
- 2 – editorial staff
- 3 – nationally syndicated columnist
- 4 – Associated Press
- 5 – ideologically conservative think tank/ public policy institute member/ fellow (specify the think tank)
- 6 – ideologically liberal think tank/ public policy institute member/ fellow (specify the think tank)
- 7 – ideologically centrist think tank/ public policy institute member/ fellow (specify the think tank)
- 8 – climate scientist

- 9 – other scientist
- 10 – government official – elected
- 11 – government official – appointed
- 12 – industry representative
- 13 – environmental activist
- 14 – staff writer
- 15 - other

Scientist citations:

- 1 – anthropogenic-supporting global warming scientist/team of scientists
- 2 – non-anthropogenic-supporting global warming scientist/team of scientists
- 3 – not clear which cause of global warming they believe – “predictions are exaggerated”
- 4 – not clear which cause of global warming they believe – “predictions are not exaggerated”
- 5- non-climate scientists

Scientist affiliation cited as:

- 1 – ideologically conservative think tank
- 2 – ideologically liberal think tank
- 3 – ideologically centrist think tank
- 4 – University
- 5 – Government agency
- 6 – Not given

Non-scientist expert citations:

Government officials

- 1 – elected
- 2 – appointed

Financial backing:

- 1 – given
- 2 – not given

Advocates

- 1 – environmental advocates
- 2 – industry advocates (specify industry(ies))

Financial backing:

- 1 – given
- 2 – not given

Think tank associate:

- 1 – from an ideologically conservative think tank
- 2 – from an ideologically liberal think tank
- 3 – from an ideologically centrist think tank

Think tank slant mentioned:

- 1 – when think tank member(s) are cited/ author an article; ideological slant of think tank given (record key word/s)
- 2 – when think tank member(s) are cited/ author an article; ideological slant of think tank not given

Financial backing:

- 1 – given
- 2 – not given

Report/paper making scientific claim (pro=anthropogenic gw and/or “predictions are not exaggerated”) or (con=non-anthropogenic gw and/or “predictions are exaggerated”):

- 1 – pro - scientific - referenced and cited by name
- 2 – pro - scientific - referenced and not cited by name
- 3 – other

Journal:

- 1 – in a journal – title of journal given
- 2 – in a journal – title of journal not given
- 3 – not in a journal
- 4 – not yet in journal, currently in approval process
- 5 – not mentioned if in a journal or not

Report/paper financial backing:

- 1 – given
- 2 – not given

Al Gore:

- 1 – mentioned – negative reference
- 2 – mentioned – positive reference
- 3 – mentioned – neutral reference

An Inconvenient Truth

- 1 – mentioned – negative reference
- 2 – mentioned – positive reference
- 3 – mentioned – neutral reference

Scientific acceptance of view – anthropogenic global warming:

- 1 – relative acceptance of scientific view within scientific community addressed
- 2 – relative acceptance of scientific view within scientific community not addressed

Scientific acceptance of view(s) – non-anthropogenic global warming:

- 1 – relative acceptance of scientific view within scientific community addressed
- 2 – relative acceptance of scientific view within scientific community not addressed

Anthropogenic (manmade) global warming overall coverage:

- 1 – balanced: presents a balanced account of debates surrounding existence of anthropogenic global warming
- 2 – exclusive: only presents argument that anthropogenic global warming exists, clearly distinct from natural variations
- 3 – dominant: presents both sides, but emphasizes that anthropogenic global warming exists, still distinct from natural variation
- 4 – skepticism dominant: presents both sides, but emphasizes dubious nature of the claim that anthropogenic global warming exists
- 5 – skepticism exclusive: only presents argument that anthropogenic global warming does not exist
- 6 – not directly addressed

Appendix B

Experimental Research – Pre-Test Survey

This study is for a graduate research thesis project conducted by a Rowan University graduate student. Please respond to the following questions and statements as honestly as possible. All responses are for research purposes only and are strictly confidential: only group data will be used.

1. Circle the statement that **BEST** represents your views on global warming.

- a) Global warming is a fallacy.
- b) I am not certain, but global warming is probably a fallacy.
- c) Global warming is an area that needs more research before I can decide.
- d) I am not certain, but global warming is probably real.
- e) Global warming is real.

Answer #2 ONLY if you answered a) or b) to #1.

2. Circle the statement that **BEST** explains your views on global warming.

- a) Environmentalist hysteria: much like global cooling, global warming is a gross exaggeration of what is actually known.
- b) Grant money: scientists study what will keep them employed.
- c) Political conspiracy: organizations like the United Nations, European Union and the Council on Foreign Relations want to sap powerful nations' sovereignty to create a one world government.
- d) Not sure.
- e) Other, please specify: _____.

3. Circle the statement that **BEST** explains global warming in your view.

- a) Natural climate variation: we are at a high point in the Earth's natural climate cycle.
- b) The sun: orbital eccentricities of the Earth and variations in the sun's output.
- c) Human activity: emissions from burning fossil fuels like coal and oil have created an enhanced greenhouse effect.
- d) Not sure.
- e) Other, please specify: _____.

4. Based on what is known today, circle the statement that **MOST** accurately reflects your view of when, if ever, the effects of global warming will begin to happen?

- a) They will never happen.
- b) They have already begun.
- c) They will start happening within a few years.
- d) They will start happening within my lifetime.
- e) They will not happen within my lifetime, but will affect future generations.

5. In your view, which one of the following statements do you think is **MOST** accurate?
- a) Most scientists agree that global warming is occurring.
 - b) Most scientists believe that global warming is not occurring.
 - c) Most scientists disagree about whether global warming is occurring or not.
 - d) Don't know.
6. In your view, which one of the following statements do you think is **MOST** accurate?
- a) Most scientists believe that global warming is a natural phenomenon.
 - b) Most scientists believe that global warming is manmade.
 - c) Most scientists are unsure about what causes global warming.
 - d) Most scientists believe that global warming is not occurring.
 - e) Don't know.
7. Thinking about what is said in the news media, in your view, the depiction of global warming seriousness is:
- a) Generally exaggerated.
 - b) Generally correct.
 - c) Generally underestimated.
 - d) The depiction is inaccurate because global warming is not a real issue.
 - e) Don't know.
8. Are you familiar with the peer review process?
- a) Yes.
 - b) No.

Answer #9 ONLY if you answered "Yes" to #8.

9. Have you ever read a peer reviewed journal article?
- a) Yes.
 - b) No.
10. Have you read Michael Chrichton's 2004 novel *State of Fear*?
- a) Yes.
 - b) No.
 - c) No, never heard of it.

Answer #11 ONLY if you answered “No” to #10.

11. Would you **CONSIDER** reading it if you had the time?

- a) Yes.
- b) No.

12. Have you seen and/or read Al Gore’s 2006 documentary/book *An Inconvenient Truth*?

- a) Yes.
- b) No.

Answer #13 ONLY if you answered “No” to #12.

13. If **No**, would you **CONSIDER** seeing and/or reading it if you had the time?

- a) Yes.
- b) No.

14. Do you understand how the Earth’s climate system works?

- a) Yes.
- b) No.

For the following statements, circle the number that **BEST** represents your views.

1 = Strongly disagree; 7 = Strongly agree

15. I understand the politics of global warming.

1 2 3 4 5 6 7

16. The peer review process produces unbiased, reliable work.

1 2 3 4 5 6 7

17. The majority of global warming experts present information about global warming in an unbiased manner.

1 2 3 4 5 6 7

Demographics

18. You are.
- a) Male.
 - b) Female.
19. Circle your age group.
- a) 18-19.
 - b) 20-21.
 - c) 22-23.
 - d) 24 or older.
20. Where do you get **MOST** of your information about global warming?
- a) TV: broadcast and/or cable news programs.
 - b) Daily newspapers: print and/or electronic.
 - c) Magazines: weekly and/or monthly.
 - d) Radio: news and/or talk radio.
 - e) Blogs.
 - f) Other source, please specify: _____.
21. Which term **BEST** summarizes your political views.
- a) Conservative.
 - b) Moderate conservative.
 - c) Moderate.
 - d) Moderate liberal.
 - e) Liberal.
 - f) Other, please specify: _____.

Appendix C

Experimental Research – *Skeptic Article (Washington Times – 11/14/04)*

Polar bear scare

Steven Milloy

"Global warming could cause polar bears to go extinct by the end of the century by eroding the sea ice that sustains them," is the dire warning in a new report from an international group of "researchers" called the Arctic Climate Impact Assessment.

I'm not quite sure about the polar bears' future, but it doesn't seem any alleged manmade global warming has anything to do with it. The report, titled "Impacts of a Warming Arctic," pretty much debunks itself on Page 23 in the graph labeled, "Observed Arctic Temperature, 1900 to Present."

The graph shows Arctic temperatures fluctuate naturally in regular cycles roughly 40 years long. The Arctic seems to be undergoing a warming phase - similar to one between 1900-1940 - which will likely be followed by a cooling phase - similar to that of 1940-1970.

The report's claim that increased manmade emissions of greenhouse gases are causing a rise in Arctic temperatures is debunked by the same graph, which indicates the near-surface Arctic air temperature was higher around 1940 than now, despite all the greenhouse gas emissions since.

Also self-debunking is the report's statement, "Since the start of the Industrial Revolution, the atmospheric carbon dioxide concentration has increased by about 35 percent and the global average temperature has risen by about 0.6 degrees Centigrade." So despite all the greenhouse gases emitted by human activity over 200 years - we're supposed to worry, even panic, about a measly 0.6 degree C rise in average global temperature in that time?

Even if such a slight temperature change could credibly be estimated, it would seem well within the natural variation in average global temperature, which in the Arctic, for example, is a range of about 3 degrees C. Remember, global climate isn't static - it's always either cooling or warming.

Though their own data indicate manmade greenhouse gas emissions and warmer temperatures don't seem to be a problem in the Arctic, the researchers nevertheless claimed these factors caused supposed 15 percent declines in both the average weight of adult polar bears and number of cubs born between 1981 and 1998 in the Hudson Bay region.

The 1999 study in the science journal *Arctic* that first reported apparent problems among the Hudson Bay polar bears suggested they might be related to the earlier seasonal break-up of sea ice on western Hudson Bay - a phenomenon that seems to correlate with the 1970-present Arctic warm-up. But, as mentioned previously, the 1970-present Arctic warming period seems part of a natural cycle and not due to manmade greenhouse gas emissions. Moreover, the notion of declining polar bear numbers doesn't square with available information.

A Canadian Press Newswire story earlier this year reported that, in three Arctic villages, polar bears "are so abundant there's a public safety issue." Local polar bears reportedly increased from about 2,100 in 1997 to as many as 2,600 in 2004. Inuits wanted to kill more bears, which are "fearsome predators."

An aerial survey of Alaskan polar bears published in *Arctic* (December 2003) reported a greater polar bear density than previous survey estimates dating to 1987.

If polar bears are getting skinnier as the 1999 study suggested, it may be due to greater numbers subsisting on the same level of available food. After all, harvesting Alaskan polar bears has been limited by the Marine Mammal Protection Act and international agreements since 1972.

The Arctic Climate Impact Assessment report has spurred new calls for a clampdown on carbon-dioxide emissions.

Sens. John McCain, Arizona Republican, and Joe Lieberman, Connecticut Democrat, told the Associated Press the "dire consequences" Arctic warming underscore the need for their proposal to require U.S. cuts in emissions of carbon dioxide and other heat-trapping greenhouse gases.

Fortunately, their call will likely get a chilly response from President Bush, who reiterated through a spokesman last weekend his continued opposition to the international global-warming treaty known as the Kyoto Protocol.

Steven Milloy is the publisher of JunkScience.com, an adjunct scholar at the Cato Institute and the author of "Junk Science Judo: Self-defense Against Health Scares and Scams" (Cato Institute, 2001).

Appendix D

Experimental Research – Context Article (*Washington Post* – 11/9/04)

Study Says Polar Bears Could Face Extinction

Warming Shrinks Sea Ice Mammals Depend On

Juliet Eilperin

Global warming could cause polar bears to go extinct by the end of the century by eroding the sea ice that sustains them, according to the most comprehensive international assessment ever done of Arctic climate change.

The thinning of sea ice -- which is projected to shrink by at least half by the end of the century and could disappear altogether, according to some computer models -- could determine the fate of many other key Arctic species, said the Arctic Climate Impact Assessment, the product of four years of work by more than 300 scientists.

Bears are dependent on sea ice because they use it to hunt for seals, which periodically pop up through breathing holes in the ice. Because the ice has broken up earlier and earlier in the year over the past few decades, polar bears are deprived of crucial hunting opportunities.

The uncertain fate of the world's largest non-aquatic carnivores -- as well as the future of other animals and humans who live in the Arctic -- was sketched in stark relief yesterday by the 139-page document.

The report offered a broad picture of the evidence that climate change has disproportionately affected far northern latitudes.

The researchers concluded that some areas in the Arctic have warmed 10 times as fast as the world as a whole, which has warmed an average of 1 degree Fahrenheit over the past century.

"The Arctic is really warming now," said Robert Corell, a senior fellow at the American Meteorological Society who chaired the assessment. "These areas provide a bellwether of what's coming to planet Earth."

In Alaska, western Canada and eastern Russia, average winter temperatures have risen as much as four to seven degrees Fahrenheit within the past 50 years, according to the report and are projected to increase an additional seven to 13 degrees over the next century. Winter temperatures have risen faster than summer temperatures, according to Michael MacCracken, chief scientist for climate change programs at the Washington-based

Climate Institute, because thin sea ice releases more energy from the ocean into the atmosphere.

The sea ice in Hudson Bay, Canada, now breaks up 2 1/2 weeks earlier than it did 30 years ago, said Canadian Wildlife Service research scientist Ian Stirling, and as a result female polar bears there weigh 55 pounds less than they did then. Assuming the current rate of ice shrinkage and accompanying weight loss in the Hudson Bay region, bears there could become so thin by 2012 they may no longer be able to reproduce, said Lara Hansen, chief scientist for the World Wildlife Fund.

"Once the population stops reproducing, that's pretty much the end of it," Hansen said.

Arctic residents have already detected changes in polar bears' behavior. Jose Kusugak, president of the Canadian Inuit political association, said at a news conference that within the past two years he witnessed a polar bear "stock up on caribou" because it was deprived of seals. Hudson Bay residents now complain the bears are coming onto land more often, forced to seek sustenance in a habitat where they are less well adapted.

Polar bears are not the only Arctic animals in trouble. The ringed seals that bears eat, and that humans hunt, are also dependent on the sea ice to rest, give birth, nurse and feed.

"You have organisms that have been pushed beyond their limits," said James McCarthy, director of the Harvard University Museum of Comparative Zoology.

While some questioned the report -- Los Alamos Laboratory atmospheric scientist Petr Chylek said he has charted declining temperatures at the summit of Greenland's ice sheet between 1986 and 2003 -- environmentalists said it shows the need for stricter curbs on greenhouse gas emissions linked to global warming.

"This study is the smoking gun. Skeptics, polluting industries and President Bush can't run away from this one," said Philip E. Clapp, president of the National Environmental Trust. He added the study showed "concrete evidence that global warming pollution is already having serious impacts."

Administration officials, who oppose mandatory curbs on carbon emissions on the grounds that it will cost U.S. jobs, said yesterday that they consider Arctic climate change an important issue and will work to draft policy recommendations for the region. Some European negotiators have complained that the U.S. State Department is resisting issuing policy guidelines based on the scientific study, a charge Bush officials deny.

"The United States is committed to working within the United Nations framework and elsewhere to develop an effective and science-based global approach to climate change that ensures continued economic growth and prosperity for our citizens and for citizens throughout the world," said State Department spokesman Richard Boucher.

Appendix E

Experimental Research – Post-Test Survey

For the following statements, circle the number that **BEST** represents your views.
1 = Strongly disagree; 7 = Strongly agree

1. Global warming is man-made.
1 2 3 4 5 6 7
2. Global warming is a natural phenomenon.
1 2 3 4 5 6 7
3. The article I just read conveyed certainty that global warming is man-made.
1 2 3 4 5 6 7
4. The article I just read conveyed certainty that global warming is a natural phenomenon.
1 2 3 4 5 6 7
5. I am certain that in the next 100 years, because of melting ice caused by global warming, polar bears will be nearly or entirely extinct.
1 2 3 4 5 6 7
6. The message of the article I just read conveyed certainty about polar bears' chances of going extinct in the next 100 years.
1 2 3 4 5 6 7
7. Which one of the following statements do you think is **MOST** accurate?
 - a) Most scientists believe that global warming is a natural phenomenon.
 - b) Most scientists believe that global warming is manmade.
 - c) Most scientists are unsure about what causes global warming.
 - d) Most scientists believe that global warming is not occurring.
 - e) Don't know.

Thank you for your time and input!

