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The Visual Framing of the Three Cycles of Climate Control in the New York Times 1851 to Present

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THE VISUAL FRAMING OF THE THREE CYCLES OF CLIMATE CONTROL
IN *THE NEW YORK TIMES*, 1851-2015

By

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Bachelor of Arts

Winona State University

2005

A thesis submitted in partial fulfillment

of the requirements for the

Master of Arts - Journalism and Media Studies

Hank Greenspun School of Journalism and Media Studies

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Thesis Approval

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ABSTRACT

**The Visual Framing of the Three Cycles of Climate Control
in *The New York Times*, 1851-2015**

by

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This research explored the visual framing of climate control in *The New York Times* through three cycles of media history. Although no peer-reviewed study has explored this specific topic, a wealth of prior communication articles on both the visual and textual aspects of climate change and geoengineering in the media was mined in order to discover the frames present. Once the visual frames of climate control (war, fix, people, and impacts) were revealed a content analysis was conducted in order to see which frame elements were most and least frequent considering the images of climate control. When combining all three cycles the frame with the highest overall mean was the fix frame ($M=1.7517$, $SD=1.34128$) indicating that it is the most occurring climate control frame per image. The frame with the lowest overall mean was the war frame ($M=.5137$, $SD=1.02544$). Frame frequency from cycle to cycle was relatively constant since only the impacts frame had a significant mean difference between cycle one and cycle two ($M=.72453$, $p=.042$). This initial analysis did not provide support for Downs issue-attention cycle theory. Although when the frame element frequencies were graphed three spikes were separated by three valleys considering climate control imagery in *The New York Times* through

about one and half centuries. This information can go towards making correlations with: events, exposure to certain stimuli, and judging effectiveness of communication strategies over time.

The discussion considered whether currently the war and fix frames could be too small in order to produce effective communication with a distrustful public. Also the recent people frame increase correlates with non-acceptance regarding climate change considering Republicans.

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“God, grant me the serenity to accept the things I cannot change, The courage to change the things I can, And the wisdom to know the difference.” --Reinhold Niebuhr

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CHAPTER ONE

INTRODUCTION

This is a study about visual images of climate control.¹ The purpose is to discover the nature of the visual images used to communicate climate control in the media. To do this, I chose the *The New York Times* to analyze because of its long and influential history as a news outlet. It is considered by many to be the “newspaper of record” (see Martin, 1998). Additionally, it is an elite newspaper which influences other media and public debates (Entman, 2008).

This study focuses on “visual frames” of climate control as conceptualized by framing theory. Bowe (2012) summarized the state of framing theory when he wrote, “just like windows on houses, news content is contained within a frame” and “the construction of the frame itself alters what people are able to see and, ultimately, how they make sense of it” (p. 158). In other words, “news content functions like a window on the world through which people learn of themselves and others, of their own institutions, leaders, and life styles, and those of other nations and peoples” (p. 158). The focus of this research is, however, not about people’s perceptions of news, but rather on the content of the news. So, this study uses content analysis to

¹ The term “climate control” is present in James R. Fleming’s title “*Fixing the Sky: The Checkered History of Weather and Climate Control*” (Fleming, 2012). Climate control encompasses many concepts including: “wild speculation and...advancing urgent proposals about how to ‘control’ the Earth’s climate...as alarm over global warming spreads” (p. 1), “weather warriors and climate engineers, both ancient and modern” (p. 3), “rainmaking” (p. 7), and “clothing and shelter” (p. 8). Fleming’s history influenced many climate communication professors like Mike Hulme, Kate Porter, Brigitte Nerlich, and Rusi Jaspal who have all cited his historical work in their communication journal articles. Marita Sturken wrote, “throughout history, the relationship of humans to the weather has been dictated by narratives of control” (Sturken, 2001, p. 163) and “the fantasy of controlling the weather by actually changing it has never been realized, and it is precisely this uncontrollability that situates the weather as a site of displaced desire” (p. 164). Even though there is considerable recent interest the term “climate control” is not new since it was found in *The New York Times* articles as early as 1881 (*New York Times*, 1881, p. 6).

analyze the images of climate control in *The New York Times* through time. This research assumes frame element frequency correlates with issue-attention cycles in the media. In other words more frame element frequency indicates a heightened awareness considering an issue in the media. Less frame element frequency means the issue has receded from the news.

Climate Control

For the purposes of this study, climate control includes ideas relating to climate change² and geoengineering.³ One reason to study climate control is because it is where the story tends to progress. To explain this, a military scientist who was involved in climate change research named J. O. Fletcher argued that climate science follows “an inevitable four-stage progression: observation, understanding, prediction, and *control* [italics added]” (Fleming, 2012, p. 238).

² The term climate change in the context of human caused warming explained by modern greenhouse effect theory goes back to at least 1955. For example Gilbert Plass talked about “climatic change” and a “change of climate” the specific theory was that “extra CO₂ released into the atmosphere by industrial processes and other human activities may have caused the temperature rise during the present century” (Plass, 1955, p. 140). It is important to note, as discussed later on in the war frame, that “this work was sponsored by the U.S. Office of Naval Research” (p. 140). Global warming and greenhouse effect fit in this semantic category. Global warming as understood today is a much different theory than as it was understood during Arrhenius’s time in the 1890’s (Fleming, 2012, p. 5). It is interesting to note “climate change in IPCC usage refers to a change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity. This usage differs from that in the United Nations Framework Convention on Climate Change (UNFCCC), where climate change refers to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods” (IPCC, 2007). Also “climate change is not climate change; it is at once much more and something very different” (Beck, 2015, p. 79).

³ The present research cited 13 communication articles that focused on geoengineering or climate engineering and how it was framed in the media. The term geoengineering was first used by Cesare Marchetti (Marchetti, 1977, p. 59). Bonnheim found a modern definition “in the American Meteorological Society (AMS) and American Geophysical Union (AGU) position statement... as ‘deliberately manipulating physical, chemical, or biological aspects of the Earth system’” (Bonnheim, 2010, p. 891). Others said “geoengineering is the ‘deliberate large-scale intervention in the Earth’s climate system, in order to moderate global warming’” (Renforth, 2012, p. 229). Geoengineering has been defined as a “quasi-stable meta-label” (Porter & Hulme, 2012, p. 344) because its meaning to some is a “discursive phenomenon, the bounds of which are continually being negotiated” (Cairns & Stirling, 2014, p. 26). Others have a clear definition but exceptions quickly make them fuzzy or not useful in all situations e.g. a “novel controversial technology” (Luokkanen et al., 2013). Geoengineering is a more modern word mostly used in communication and science journals, news articles, and government documents to describe intentional actions to combat the effects and main cause of global warming that is reducing carbon dioxide. William Ruddiman (who wrote a textbook on climate change) said climate change was an inadvertent form of geoengineering (Ruddiman, 2014, p. 323).

Another reason to study climate control is because it is ripe for continued research. For example, the Intergovernmental Panel on Climate Change (IPCC)⁴ discussed geoengineering at an “Expert Meeting” in 2011 at Lima, Peru (IPCC, 2011). The IPCC noted that, “Geoengineering, or the deliberate large-scale manipulation of the planetary environment, is increasingly being discussed as a potential strategy to counteract anthropogenic climate change.” (IPCC, 2011).

Although climate control is important, expensive, and perhaps dangerous public understanding of the issue is low. For example, only “8% and 45% of the population correctly” defined “the terms geoengineering and climate engineering respectively” (Mercer, 2011, p. 1). Furthermore, “due to their failure to understand basic scientific terms or nature of the scientific process, 80 percent of Americans can’t read the *New York Times* science section” (Mooney & Kirshenbaum, 2009, p. 13). Also, “only half of the adult populace knows the earth orbits the sun once per year” (p. 13). Making matters worse, climate control concerns “new technology and public opinions are just forming; thus all reported results are sensitive to changes in framing, future information on risks and benefits, and changes to context” (Mercer, 2011, p. 1). Since science is so important in terms of increasing society’s economic, military, and industrial power (while also ensuring its environmental and social sustainability) it is vital we understand, communicate, and live with science better. If the public has a good understanding of science it will be in a better position to elect the right leaders who can then make the best policies. If the public and elite technocrats are not of one accord civil unrest and political illegitimacy could be the result.

⁴ The Intergovernmental Panel on Climate Change (IPCC) “is the leading international body for the assessment of climate change. It was established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) in 1988” (IPCC, 2015). The 2007 Nobel Peace Prize was awarded to the Intergovernmental Panel on Climate Change (IPCC) and Al Gore “for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change” (The Nobel Peace Prize for 2007, 2015).

The history of climate change in the media is in need of study in order to build context for making decisions about climate mitigation and climate adaptation choices. It can also be used to see how different framings of climate change in the media played out in the past—and how they might play out again in the future. Communication researcher Saffron O’Neill wrote, “media organizations are powerful institutions shaping, reproducing and consuming climate change meanings...and a key tool for their meaning-making is the deployment of visual imagery” (O’Neill, 2013, p. 10). Although “visual images are everywhere in the portrayal of climate change...scholars in sociology, geography and communication studies have all called attention to the lack of research investigating climate visualization” (O’Neill, 2014, p. 73).

Framing

This study is grounded in framing theory and content analysis is used to understand how visual frames have defined climate control over time. Part of framing theory involves definitions and context building. This is done via media frames which focus on the presentation of information, how information is made, and its manifest content. The other half of framing theory concerns individual’s prior mental maps that help organize incoming news or audience frames. This facet of framing theory is, however, beyond the scope of this thesis. Instead the focus is on the manifest content of the visuals, including pictures, graphs, and drawings which are sometimes more powerful in terms of persuasion compared to “facts and information” (Gamson, Croteau, Hoynes & Sasson, 1992, p. 374). For example,

We walk around with media-generated images of the world, using them to construct meaning about political and social issues. The lens through which we receive these images is not neutral but evinces the power and point of view of the political and economic elites who operate and focus it. And the special genius of

this system is to make the whole process seem so normal and natural that the very art of social construction is invisible. (Gamson, Croteau, Hoynes & Sasson, 1992, p. 374).

This study includes four frames distilled from the literature. They are entitled the war frame, the fix frame, the people frame, and the impacts frame. Each of these is described later on in its own section, but briefly, the war frame is commonly used to present climate change as a battle or fight that society can win. The fix frame presents the Earth's climate as an understandable machine in which the controls are within humankind's reach. The people frame focuses on the people and personalities associated with climate change. Finally the impacts frame frames the issue by showcasing the effects of climate change. These frames are the dependent variables this study intends to track via a visual content analysis of *The New York Times* from 1851 to the present.

Cycles of Time: The Independent Variable

Going back to 1851 and dividing the independent variable (time) into three cycles, this study is longitudinal. Time, categorized into discrete increments called "cycles," comes from Fleming's "The Pathological History of Weather and Climate Modification: Three Cycles of Promise and Hype." His work traces climate control and its recording in the popular press starting in 1824. Also relevant is, Anthony Downs "issue-attention cycle" (Downs, 1972, p. 38) which was proposed to help explain public attitudes regarding the "widespread upsurge of interest in the quality of our environment" (p. 38). Downs separated media coverage of

environmental issues into five phases⁵. The Downsian model was used by many climate control communication professors (Brossard, Shanahan, & McComas, 2004; Boykoff & Boykoff, 2007; McComas and Shanahan, 1999; Rebich-Hespanha, Rice, Montello, Retzloff, Tien, & Hespanha, 2014; Trumbo, 1996; Wilson, 2002) so that is why it was incorporated into this research's literature review and research questions. The goal of this research is to understand the visual images of climate control found in *The New York Times* in historical terms. As such, it is argued, we can understand visual representations of climate control along three chronological cycles.

The first cycle starts with images in print from 1851 (this date constrained by sample material) until 1940 when climate control became more militaristic due to the influences of the World Wars. This influence ushered climate control coverage into cycle two discussed next. The first cycle is more peaceful and philosophical than the later cycles. Cycle one is typified by two articles in *The New York Times* entitled "The Control of Climates" (*The New York Times*, 1881, pg. 6) and "Choice of Climate Is Held Man's Own" (M'Cormaus, 1938, p. 40). During this cycle it was thought that weather could be manipulated in order to increase rain and warmth for better growing seasons. The political implications of weather control were first discussed in these early articles. This cycle is hence referred to as "cycle one."

The second cycle of climate control starts in 1941 but according to the following source is most intense from "the International Geophysical Year in 1957 to the aftermath of the 1972 UN Conference on the Human Environment" (Hart & Victor, 1993, p. 643) as periodized by the article "Scientific Elites and the Making of US Policy for Climate Change Research, 1957-74"

⁵ Downs wrote "the bundle of issues called 'improving the environment' will also suffer the gradual loss of public attention" (Downs, 1972, p. 50). Boykoff and Boykoff disagreed but summarized Downs cycles as: "(1) the 'pre-problem stage'; (2) the 'alarmed discovery and euphoric enthusiasm' stage; (3) the gradual-realization-of-the-cost stage; (4) the gradual-decline-of-intense-public-interest stage; (5) the 'post-problem stage' in which the formerly 'hot' issue 'moves into a prolonged limbo—a twilight realm of lesser attention or spasmodic reoccurrences of interest' (Boykoff & Boykoff, 2007, p. 1195). Boykoff and Boykoff argued "how would the Downsian model explain the increase in coverage in 1997, 2001-2002, or 2004?" (p. 1195).

(p. 643). In this cycle climate control branched into

“two research programmes—carbon-cycle research and atmospheric modeling.

The major political strategies followed by the relevant élites connected with these programmes were concerned with the pursuit of professional autonomy, with weather modification and with environmentalism. Changes in élite strategy followed mainly from events outside science, in the policy and politics ‘streams’, rather than from scientific findings” (p. 643).

This second cycle is visually represented by the May, 1954 cover image for *Collier’s* magazine which shows a “technocrat pulling the levers of weather control” (Fleming, 2010, p. 175). The second cycle, typified by increased political and militaristic involvement, ends in 2005. This cycle is thus referred to as “cycle two.”

The third cycle covers 2006 until the present when climate control became more widely known as geoengineering or the fight against climate change and global warming. The year 2006 was picked as the starting point of this cycle because that is when quantitative data showing “the amount of leading English-speaking newspapers with geoengineering as main topic, over time” first started to appear (Scholte, Vasileiadou & Petersen, 2013, p. 11; Porter & Hulme, 2012, p. 346). This cycle will subsequently be referred to as “cycle three.”

Gaps in Media Coverage

Research shows that there are gaps in media coverage of climate control. The gap in media coverage of climate control from the late 1970’s until late 1980’s, for example, is documented by researchers (Boykoff & Boykoff, 2007, p. 1194). Also, an earlier gap in media coverage on climate control in the 1940’s may correlate with major political events during that

time that would have received more attention for example World War II. These gaps in coverage reinforce Anthony Downs issue-attention cycle which does “not underestimate the American public’s capacity to become bored” (Downs, 1972, p. 49). In other words the issue must be dramatic and exciting to maintain public interest” (p. 42) therefore unless climate change produces an effect like “killer smog’ that would choke thousands to death in a few days” (p. 46-47) interest could decrease.

Other more recent communication researchers who focused on the visual imagery and the political framing of climate change in the media found “that these peaks in coverage seem to be associated with major reports or conferences [which] reinforces Downs (1972) concept of issue attention cycles” (Rebich-Hespanha, Rice, Montello, Retzloff, Tien, & Hespanha, 2014, p. 8). The present research attempts to find support (or not) for Downs model through its longitudinal examination of *The New York Times* articles.

The rest of this study fleshes out the key concepts of media frames and longitudinal analysis of climate control in the literature review, explains how these concepts are operationalized and how data is collected in the methods section, explores the findings in the results, and concludes with a discussion section.

CHAPTER TWO

LITERATURE REVIEW

While discourse and textual analysis regarding climate control (as mentioned in the introduction, this study combines climate change and geoengineering under the umbrella of climate control) has been extensively studied (Boykoff & Boykoff, 2007; Hulme, 2008; Koteyko, Thelwall, & Nerlich, 2009; Woods, Fernandez, & Coen, 2010; McComas & Shanahan, 1999; Nisbet, 2009; Trumbo, 1996; on geoengineering: Luokkanen, Huttunen, & Hildén, 2013; Macnaghten & Szerszynski, 2013; Markusson, Ginn, Singh Ghaleigh, & Scott, 2014; Nerlich & Jaspal, 2012; Scholte, Vasileiadou, & Petersen, 2013; Sturken, 2001), fewer studies exist on the visual aspects of climate control (DiFrancesco & Young, 2011; O'Neill, 2013; Rebich-Hespanha, Rice, Montello, Retzloff, Tien, & Hespanha, 2014; Smith & Joffe, 2009; Nicholson-Cole, 2005; O'Neill, & Hulme, 2009; O'Neill & Smith, 2014).⁶ This review of the literature examines visual images of climate control and its historical cycles via framing theory, which serves as a way to organize the images of climate control. Again, the goal of this research is to identify and track the visual images used to portray climate control in *The New York Times* over time.

Framing Theory

The theoretical basis for this study is framing and its kaleidoscope of meanings, mutations, and methods as defined by the researchers who have studied it (Bateson, 1955;

⁶ Communication research regarding climate control does not focus on media coverage before the 1970's but preliminary exploratory analysis from the present research has brought to light many articles that need categorizing and discussion that go back further.

Bellamy, 2013; Borah, 2011; Boykoff, 2013; D'Angelo, Kuypers, & Young, 2011; Entman, 1993; Goffman, 1974; Iyengar, 1996; Kahneman & Tversky, 1984; Koteyko, Thelwall & Nerlich, 2009; Lakoff, 2010; Luokkanen, Huttunen, & Hilden, 2013; Markusson, 2013; Markusson, Ginn, Singh Ghaleigh, & Scott, 2014; Nerlich, 2014; Nerlich & Jaspal, 2012; Nisbet, 2009; Rebich-Hespanha, Rice, Montello, Retzliff, Tien, & Hespanha, 2014; Rodriguez & Dimitrova, 2011; Scholte, Vasileiadou, & Petersen, 2013; Spence & Pidgeon, 2010; Porter & Hulme, 2013; Trumbo, 1996). Bowe (2012), highlights a few problems regarding framing theory which “has at times pushed the field toward incoherence” because researchers only give an “obligatory nod to the literature” when operationalizing the frames (p. 158). In order to improve this situation close attention was paid to prior framing research in order to establish framing theory with somewhat agreed upon standards regarding climate control in the media.

According to communication researchers, “a large and growing body of literature in framing studies has emerged in recent years” (Borah, 2011, p. 246). Evidence for this is apparent in the extensive (but not all inclusive) reference list at the beginning of this chapter specifically researchers discussing climate control (in terms of geoengineering) said “frame analysis is increasingly used as a tool to study media content on the mutually bound issue of climate change” (Porter & Hulme, 2013, p. 343). Markusson gave a succinct literature review regarding the framing of climate control (again in terms of geoengineering):

...there is a small, but growing body of literature on geoengineering *discourse*, through such different but related lenses as frame effects of functions (Bellamy, et al., 2012; Scholte, et al., 2013), metaphors (Nerlich and Jaspal, 2012; Luokkanen, et al. 2013), and discursive strategies (Sikka, 2012). A few findings recur across studies and over time. Notably, Nerlich and Jaspal (2012) identify emergency as a master argument...beyond that, the findings of this literature are rather divergent, producing lists of frames and metaphors that are not easily reconcilable (Markusson, 2013, p. 5) [Italics added].

Framing theory is multidisciplinary and includes ideas from “sociology, economics,

psychology, cognitive linguistics...communication...political science...and media studies” (Borah, 2011, p. 246). Historically, Erving Goffman and Gregory Bateson are, arguably, the foundation of framing theory. Goffman borrowed heavily from Bateson’s early definition of framing and in order to understand Goffman’s definition one must consider Bateson’s as well (Goffman, 1974, p. 7). Bateson’s definition of framing was a cross between the actual physical picture frame and a mathematical idea known as set theory (Bateson, 1955, p. 322). The more concrete picture frame component has to do with the analogy of the picture frame, the picture itself, and the surrounding wallpaper. These three components have to do with the inclusion and exclusion of things (p. 323). Taking this idea one step further Bateson said, “the picture frame tells the viewer that he is not to use the same sort of thinking in interpreting the picture that he might use in interpreting the wallpaper outside the frame” (p. 323).

A large portion of both framing theory and controlling the weather involves naming things (Sturken, 2001, p. 164) and “to realize what things are called is incomparably more important than what they are” (Nietzsche, p.121). For example Boykoff cites the example when,

BP, Transocean, and Halliburton attempted to scrub their name from the disaster title: These efforts demonstrated how these carbon-based industry actors placed great importance on the desire to avoid negative repercussions through such naming and shaming. Exploring things in this way opens up questions about how power flows through the capillaries of our shared social, cultural, and political body, constructing knowledge, norms, conventions, and (un)truths (Foucault, 1980). The cultural politics of climate change lurk in a multitude of spaces (recreational centers, neighborhoods, pubs, workplaces, schools, and town centers). “Actors” in this discursive and material theater—from climate scientists to business industry interests and environmental activists—are ultimately all members of the “public citizenry.” The cultural politics of climate change are situated, power-laden, mediated, and recursive in an ongoing battlefield of knowledge and interpretation (Boykoff, 2013, p. 801

Framing theory can be broken into two parts: “sociological” and “psychological” (Borah, 2011, p. 247). The sociological approach holds that “frames help people organize what they see

in everyday life... and...highlight some aspects of reality while excluding other elements” (Borah, 2011, p. 248). It is also the branch of framing theory which intends to understand the ways in which common sets of ideas are grouped, presented, and debated (Bateson, 1955; Goffman, 1974; Entman, 1993; Miller, 2000; Trumbo, 1996). Goffman’s original frame analysis comes from this school which mainly focuses on “the structure of experience individuals have at any moment of their social lives” (Goffman, 1974, p. 13). This includes the processes journalists use to create news content also known “media frames” (Borah, 2011, p. 248). Kate Porter and Mike Hulme researched the framing of climate control in the media and followed the sociological foundation when they said, “Entman’s (1993) work is generally taken as an initial point of entry into media frame analysis...Entman defines media framing as ‘selecting some aspects of a perceived reality and making...them more salient in a communication text in such a way as to promote a particular problem, definition, causal interpretation, moral evaluation, and /or treatment recommendation for the item described’” (p. 343). Cairns and Stirling (2014) cited two other papers that focused on media frames and geoengineering written by Scholte (2013) and Luokkanen (2013). In general articles like these that focused on media frames have to do with analyzing the specific content from the media and “frame production...or the process through which media frames are actually created” (Borah, 2011, p. 249). For example according to Trumbo, “themes that emerge in media representation of an issue can be called frames” (Trumbo, 1996, p. 270). Furthermore media frames or media “framing essentially involves selection and salience. To frame is *to select some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation for the item described.*” (Entman, 1993, p. 52). Entman then gave an example of the “cold war’ frame

that dominated U.S. news of foreign affairs until recently. The cold war frame highlighted certain foreign events—say, civil wars—as problems, identified their source (communist rebels), offered moral judgments (atheistic aggression), and commended particular solutions (U.S. support the other side)” (p. 52). Media or sociological framing theory studies make up the vast majority of the total studies on framing theory reviewed in this research. All the researchers (except the next six who looked at the psychological or audience frame theory) used the sociological or media frame theory approach.

An example of audience framing analysis that uses the psychological or audience frame approach is exemplified by Kahneman and Tversky (1984) “who were the first to demonstrate how different presentations of essentially the same information can have an impact on people’s choices” (Borah, 2011, p. 248). Spence and Pidgeon then applied these ideas to climate change in “Framing and Communicating Climate Change: The Effects of Distance and Outcome Frame Manipulations” which investigated if past health and behavioral research findings on the effects of framing information in order to manipulate attitudes and behaviors were transferable to the case of climate change in the media (2010, p. 656). Their study conducted in 2009 examined cognitive framing theories via peripheral persuasion cues derived from the “2007 Intergovernmental Panel on Climate Change report” (2010, p. 656). The questions Spence and Pidgeon asked included which frames had the most impact on beliefs and were the findings in harmony with prior research not specifically associated with climate change narratives in the media. The outcome frame tested included gains or losses associated with climate change news narratives. For example, if a news article frames the topic of alternative energy as how much it will cost the taxpayers, that is a loss frame, but if the frame is how much they will save from the future prevention of climate change, that is a gain frame. These frames were incorporated into

the present research's coding instrument specifically regarding the impact frame and whether climate change was viewed as negative (frame elements 33 & 34) or positively (frame element 44). Classic theories in the risk domain were generally supported as well as the psychology health frames when compared with Pidgeon's study that looked at climate change narratives specifically. Another group of researchers, Phil Macnaghten and Bronislaw Szerszynski (2013), looked into audience or psychological framing analysis which investigated the effects different geoengineering frames had on an audience and was used to construct the coding instrument used in the present research. One of their frames they introduced was "the conventional frame of the perceived need to buy more time for greenhouse gas mitigation policies to become effective" (p. 472). This frame was not included but this next one was included, "the possible use of solar radiation management techniques for social, political and military purposes unrelated to climate change" (p. 468) specifically frame 1: Climate Control is War.

Besides media and audience frames framing theory is further divided (roughly) into discourse and visual sections. Since the previous section looked at discourse framing theory this next section focuses on literature about the visual framing of climate control.

Visual Framing Of Climate Control

Communication researchers have emphasized the "power of imagery to reduce complexity and galvanize public opinion" by "providing interpretive frames or narratives that selectively blend fact and emotion" (DiFrancesco and Young, 2010, p. 518). Applying these ideas to climate change they have quoted Richard Rorty who said, "It is pictures rather than propositions, metaphors rather than statements, which determine most of our philosophical convictions" (p. 517). They also gave examples like the "powerful effect of Al Gore's 2006

activist documentary *An Inconvenient Truth*” that “suggests...visual imagery is essential for making climate change ‘consumable’ for a sizable fraction of the population” (p. 518).

Summarizing the work of other researchers DiFrancesco and Young said “imagery is an important part of textual claims-making” since it “provide[s] a kind of cognitive short cut compressing a complex argument into one that is easily comprehensible and ethically stimulating” and “the visual [has a] particular ability to arouse emotion, making it an effective medium for the social construction of risk messages” (p. 519).

Although prior communication research has looked at the visual framing of climate change the research is scattered and usually amounts to setting up a whole new framework with little building of past research (Rodriguez, 2011, p. 51) The one common thread with all prior research (before around 2012) within the visual framing of climate control field is that they all agreed little to no research had been done compared to the textual side of framing⁷. Although no visual framing analysis on geoengineering has been conducted, much of the research from the visual analysis of climate change can be borrowed for example the sampling methods and operationalization of the units of analysis which was mostly conducted on the images only. Although “DiFranseco and Young’s Canadian study is particularly enlightening for the way it focuses on both imagery and texts” (p. 77); they found a “profound disjuncture’ between images and text...with visual and linguistic coverage pulling in different narrative directions” (p. 77).

⁷ What makes this study different from all the others is that it is focusing on the frames that go along with the visuals of climate control. Mike Hulme and Brigitte Nerlich were consulted and both researchers said a visual framing analysis was needed but did not yet exist. Nerlich provided a PowerPoint where she had added pictures to go along with her discourse frames (Nerlich, 2014). Although she did not analyze the visuals, her work is the starting point for this thesis. The other thing that makes this research paper stand out (for better or worse) from the others is that it’s longitudinal going all the way back to 1840. This decision was influenced by Fleming’s “The Pathological History of Weather and Climate Modification: Three Cycles of Promise and Hype” which traces climate control and its recording in the popular press starting in 1824.

This trend changed thanks to recent funding for climate change communication research which ended the time when there was a “lack of research investigating climate visualization” (O’Neill & Smith, 2014, p. 73). Some of the methods used to investigate the visual representations of climate change include “content analysis, discourse analysis, semiology, surveys, Q-method, social semiotics, and photoelicitation...methods...not...yet... applied...include ethnography and compositional interpretation” (p. 84). This researcher generally suggests that “images have several qualities that aid in information exchange: they can draw viewers in through vivid emotive portrayals, they aid in remembering information, and (providing audiences share cultural references which allow them to decode the image), they can transcend linguistic and geographical barriers” (p. 73). Furthermore, the “media exert considerable power on the public and political agenda” and “may shape public understanding of topics...as ‘knowledge about science comes largely through mass media, not through scientific publications or direct involvement in science” (Scholte, Vasileiadou & Petersen, 2013, p. 2). Another factor adding attention to the visualization of climate science comes from the science itself because “the work of climate science cannot be done without the work of visualizations, as scientific images arising from climate model simulations (e.g., the maps, figures, and graphs used to illustrate the IPCC reports) are essential to be able to communicate climate data” (O’Neill & Smith, 2014, p. 79).

This thesis builds on this visual movement and concentrates on conducting a content analysis on *The New York Times* from 1851 to 2014. Media coverage was analyzed during three cycles of climate control (conceptualized above) in order to look for common and different themes or frames (Fleming, 2012). One study that looked at the emergence of geoengineering in the UK print media from 1992 to 2011 found 70 articles (Porter & Hulme, 2012, p. 346). Another looking at the “proselytizing and popularizing press” found 91 articles (Nerlich &

Jaspal, 2012, p. 91) and another found 181 articles from 2006 to 2011 using the terms “geoengineering”, “geo-engineering”, and “climate engineering” in LexisNexis (Scholte, Vasileiadou, & Petersen, 2013, p. 6).

One of the goals in looking at past visual communication research on climate change is to find specific frame types that might be re-used instead of being reinvented. The frames used in this study are distilled from the literature and they include climate control is war, the fixed frame, the people frame, and the impacts frame.

The War Frame

The war frame is sometimes investigated in climate control communication research on framing theory. For example “the battle against climate change” or the “metaphors of war and fight” were the most common type in one study on linguistics of climate change or one of its sub-sections known as “climate modification” or “climate management” (Luokkanen, Huttunen, and Hilden, 2013, p. 1, 2, & 6). This is partly because “the discovery of global warming would have been impossible without scientific projects funded by the American military” (Hamblin, 2013, p. 9). This relationship between climate control and the military goes back to James Espy (and even further back if we consider the Kamikaze winds that saved Japan from Mongolian invaders and Greek gods like Poseidon).⁸

This perennial relationship between climate control and the military continued into the 90’s as Al Gore’s campaign against the greenhouse effect and climate change was helped with top-secret scientific visuals released by Medea, a U.S. military committee⁹. The goal of the

⁸ Although the war metaphor is common and used to frame other issues such as cancer, poverty, drugs, and crime when considering climate control it contains a deeper literal connection that the other issues may or may not have as well.

⁹ The MEDEA program was the “first post Cold War review of National Security Systems, Data and Archives for

releasing of these images was to help climate scientists better observe the catastrophic effects of climate change and to convince the public of the seriousness when it came to lowering carbon dioxide concentrations in the atmosphere immediately (Mervis, 1999). Without the military research from the likes of JASON and other Dr. Strangelove-like¹⁰ scientists from the Cold War and the more modern version being the geophysical scientists who originated from the military as described by Vannevar Bush's book *Science: The Endless Frontier* climate control would have stayed in the Cli-Fi and religious genres.¹¹ For better or worse this close relationship between science and the military should surface in the visuals of climate control as a frame. Without the military via elite groups like JASON and Medea climate change and its Janus twin climate control and its love child geoengineering would have gone possibly undiscovered and undeveloped. Therefore, media coverage of climate control would not have existed either.

The communication literature contains examples that highlight the military frame considering climate control in the media. Nerlich and Jaspal found four themes relating to geoengineering in their analysis of the “proselytizing and popularizing press” (Nerlich & Jaspal, 2012, p. 134). They included “geoengineering as a techno-fix, geoengineering as a medical fix, geoengineering as Plan B, and metaphors and arguments of discontent” (p. 135). This research also found a major “master argument used to promote geoengineering...called the argument

use in Global Climate Change, Environmental Research and Civil Applications by cleared Environmental Scientists” (NOPP, p-13).

¹⁰ In order to get an idea of how the Rand Corporation was framed in the mainstream media see “Bland” inspired reference in *Dr. Strangelove or: How I Learned to Stop Worrying and Love the Bomb* (Kubrick, 1964). This reference demonstrates how catastrophic influences permeated visuals including movie themes. Communication researchers found the Dr. Strangelove metaphor being used 3 times in order to relate “a negative attitude to geoengineering” (Luokkanen, 2013, p. 7&12).

¹¹ As the Koran exemplifies in, “the signs of the weather coming from Allah” the new subconscious message is, “weather control was a power once reserved for the ancient sky gods, but has seemingly devolved to modern Titans: the climate engineers” (Fleming, 2007, p. 51). At the International Conference on Climate Change (IPCC9) a preacher was one of the main speakers. The God Frame or God Replacing Frame is therefore one this research analyzed.

from catastrophe or argument from necessity. Gardiner calls it, using the ‘DEALING WITH CLIMATE CHANGE IS WAR’ metaphor (p. 136). Also geoengineering communication has used a “link to an image well-known from the cold war, namely the political ‘Panic Button’ which becomes the ‘Climate Panic Button’ in the article’s headline” citing an article by Ken Caldeira from 2007 (p. 136). Furthermore, Cohen’s “comprehensive... investigation... reveals that militaristic representations—principally through the phrase ‘war on (or against) climate change’—began to noticeably infiltrate news coverage in 2005 and this trend has become more prominent over the last few years” (Cohen, 2011, p. 203). This war frame associated with climate control matters because

Frames make us see and act upon the world in specific ways. They create visions and expectations, which, as the sociologist Nik Brown put it, can ‘mobilize the future into the present’ (or in the case of geoengineering mobilize actions to avert a future that is framed as catastrophic). They can be used to orientate users...to particular possibilities for action... and in the case of geoengineering, on the survival of the human species or the type of world we want to live, or, indeed die in” (p. 134).

Researchers have also found,

The use of war metaphors in the context of geoengineering may partly bring new meaning to the ‘combating’ and modify the framing of climate change. Climate skeptics who are opposed to combating climate change using conventional means of mitigation may see geoengineering as an acceptable way to prepare for a worst case, while those who stress the necessity of conventional combat may be strongly opposed against geoengineering. This further encourages the use of war metaphors both for and against geoengineering” (Luokkanen, Huttunen & Hilden, 2013, p. 14).

In order to better understand the war frame it is important to understand the history of climate control. According to Fleming “throughout history and across cultures, civilizations have told stories about gods and heroes who have attempted to control that which may be largely uncontrollable” (Fleming, 2012, p. 15). According to his book these earliest stories come from

“Greek mythology, the Western canon, Native American rainmaking. . . , geo-science fiction before about 1960, pulp fiction, the stage and silver screen, and the boob tube” (p. 15). Other sources of these stories come from scientific papers and official government documents assembled together in *The Discovery of Global Warming* by Spencer Weart (2008). Tracing major papers from his work one finds that the words “climatic” and “change” first appeared together (in the context related to the greenhouse effect) in a scientific paper by Gilbert Plass called “The Carbon Dioxide Theory of Climatic Change” sponsored by the U.S. Office of Naval Research (Plass, 1955, p. 140). Ten years later, the first official warning about climate change came from the White House (Panel, 1965). This early alarm carried a caveat since climate models were “unable to take into account the vertical transfer of latent heat by evaporation at the surface and condensation aloft, or of sensible heat by convection and advection”; therefore “computations probably over-estimate the effects on atmospheric temperature of a CO₂ increase” (Panel, 1965, p. 121). Even today “convection is notoriously difficult to determine” (Yano, 2011).¹² This uncertainty is highlighted by a story about Roger Revelle. He was the Chairman of the Atmospheric Carbon Dioxide section of the mentioned 1965 White House report. Some accounts suggest he later recanted these earlier projections in public letters and at a speech he gave at Bohemian Grove (The Auto Channel, 2009) he said we did not have a good understanding of the effects of CO₂--although Al Gore (his former student) called him senile (Lindzen, 2006, p. 204).

Some climate change histories focus on the relationships between “scientific elites” (Hart & Victor, 1993, p. 643) and “policy making” (Hecht & Tirpak, 1995, p. 371) and ask, “When did

¹² The American Physical Society’s (APS) Climate Change Statement Review (CCSR) Workshop Framing Document contains many questions that “highlight fundamental issues in current understanding of the physical basis of climate change” (Coyle et al., 2013, p. 1).

the process really begin?” (p. 371). The answer they found is surprising since their history of climate change and climate control being born from the military was neglected in the communication articles regarding the history of climate change in the media (Swain, 2012, p. 163). For example Kristen Swain’s history only mentions one climate change news article from 1957 and then stated, “In the subsequent 3 decades, climate coverage remained sparse” (p. 163). Although if we consider climate control media coverage was not sparse and it began earlier. According to science and social historians climate change research was first funded by the U.S. during the Cold War specifically in the 1940’s when “fear of a secret explosion...drove the Joint Chiefs of Staff to insist upon the development of a worldwide radiological monitoring network”¹³ (Hamblin, 2013, p. 87). Alan Hecht and Dennis Tirpak included a story about the Advanced Research Projects Agency (ARPA) and Rand teams coming together on a secret climate project called “Nile Blue” in its history of climate change. Many of these climate warfare stories were documented in newspaper articles and magazine covers but this interaction is missing within histories done by communication articles. Climate change histories not in the communication field then describe a mingling with the environmental movement after the U.N. declared climate warfare illegal (U.N. Documents, 1977). For example, “several of the biologists, oceanographers, and atmospheric scientists who advised governments on the 1977 treaty to ban military uses of environmental modification—the ENMOD convention—were enlisted to craft the first major reports on anthropogenic climate change” (Hamblin, 2013, p. 10) and “the same computer modeler who helped develop defense systems for the entire northern

¹³ Radiological monitoring has to do with measuring carbon isotopes in the atmosphere. A change in the ratio of isotopes signifies an atomic explosion. Isotopes also help date materials and reveal past ocean temperatures. Although the processes have been polished the basic fundamentals were carved out by the military and are essential to modern climate science (Emiliani & Edwards, 1953, p. 887).

hemisphere in the 1950's, Jay Forrester, was one of the first to publish quantitative prediction of environmental doomsday in the early 1970's" (p. 10).

Journalism has a cornerstone place in this military driven climate control history because of its involvement with the Pentagon Papers and an article in *The New York Times* which helped break the secrecy of the U.S. military's climate modification programs like Operation Pop Eye¹⁴ (Hersh, 1972, p. E3). Media coverage concerning the topic of climate control was highlighted by the cover of Fleming's (2012) book which was adapted from climate modification news coverage portrayed on the front page of *Colliers* magazine on May 28, 1954. This article depicts a technocrat pulling a lever while looking at two skies (one sunny the other stormy) he is controlling. The caption reads "Ike's Adviser Reports Man's Progress in Weather Control". Without the monitoring and prediction steps associated with climate change during its militaristic origins climate control would not be possible as we know it today.

In order for climate control to work as intended the first stages (monitoring, understanding, and prediction) must align with reality or in other words the models must work. According to climate scientist William Ruddiman, "like atmospheric models, most ocean GCMs have limitations imposed by their grid box size" (Ruddiman, 2014, p. 73).¹⁵ These scientific problems did not get in the way of those like Joseph O. Fletcher of the Air Force who created the Rand Corporation. As the visuals in Fleming's book highlight, throughout history very little has changed in the hubris and ambition level of those who believe they can control the climate. For

¹⁴ Operation "Pop Eye" was a "way to turn nature into a military tool" first "flown by the C.I.A. in 1963" (Hersh, 1972, p. E3). It was a "secret rain-making project over the Ho Chi Minh Trail" (p. E3) that went "underground" during John F Kennedy's administration but was accepted later on by other administrations (p. E3). In 1971 North Vietnam had a major flood that killed 100,000 people (NOAA, 1999). By 1972 articles in the popular press no longer made this specific program secret and it dissolved.

¹⁵ Grid box size has to do with resolution or how big the virtual 3D cubes used in the computer's general circulation model (GCM) programs are in terms of kilometers. Each cube contains the approximate values and conditions extrapolated from the real world. The cubes then interact with each other in the virtual world via expensive super computers built by IBM.

example, in 1842 when the United States' first "national meteorologist" James Espy "suggested cutting and burning vast tracts of forest to create huge columns of heated air, believing this would generate clouds and trigger precipitation" (Fleming, 2007, p. 51). In 1934 F. A. Silcox wrote an article in *The New York Times* and the title reveals much *To Insure Against Drought, A Vast Plan Takes Shape; The Program for a Belt of Trees Reaching From Canada to Texas Envisages Modification of the Climate of the Great Plains*. Today, instead of burning or creating forests, climate scientists suggest planting forests to absorb CO₂, injecting aerosols into the air with guns, blimps, and jets, and crushing rocks to spread in the tropics (plus many more geoengineering schemes).

It has taken nearly six decades for these military scientists' theories regarding greenhouse gases to be taken seriously but today according to all the climate change communication articles, the Intergovernmental Panel on Climate Change (IPCC), and many other scientific agencies connected to the government and non-government organizations it has become an established paradigm. Therefore those who follow this paradigm contend communicating climate change science effectively to the public is necessary for mitigating and adapting to dangerous anthropogenic or man-made climate changes caused by increased greenhouse gasses. This is because public support is needed in order to generate the political will necessary to enact binding carbon dioxide reduction treaties. Also environment friendly energy and infrastructure planning policies benefit from public support as well. Another way the carbon dioxide problem can be alleviated is with a technological fix similar to how sulfur dioxide emissions were controlled via Clean Air Acts and scrubbing equipment in the 1970s. Sulfur dioxide emissions rose fast during the 1950s and 1960s. If the trend would have continued some scientists predicted the introduction of an ice age as a result (Peterson, Connolley & Fleck, 2008, p. 1325; Rasool &

Schneider, 1971, p. 138). This series of events and others like it helped produce the fix frame mindset.

The Fix Frame

One of the main goals of the discussion in the IPCC reports is to “take into account the possible impacts and side effects and their implications for mitigation cost in order to define the role of geoengineering within the portfolio of response options to anthropogenic climate change.” (IPCC, 2011). This message from the IPCC reports is reflected and framed in the popular press using the fix frame—if one was to apply the methods from the present research. The *Las Vegas Review-Journal* framed geoengineering with the words “new technologies to suck greenhouse gases from the atmosphere” (Ritter, 2014, p. 8A). The word “suck” conjures a visual image of a vacuum or some other technology that physically sucks carbon dioxide from the atmosphere. In reality not all of these technologies would suck CO₂ because some absorb carbon dioxide in a chemical reaction and some block incoming solar radiation so this description might lack scientific technical accuracy but is still gets the basic point across. An example from the third cycle comes the cover of the Spring 2007 issue of the *Wilson Quarterly*. This cover depicts a scientist with glasses and tie who has a phallic gun that blasts the climate with some unknown substance thereby fixing it and engaging it in war (Fleming, 2007). Fleming described the origin of the fix frame when he said “In 1966 physicist Alvin Weinberg coined the term technological fix. Since then, it has come to connote simplistic or stopgap remedies to complex problems, partial solutions that may generate more problems than they solve” (Fleming, 2012, p. 8).

Some climate control communication researchers “have compared framings of geoengineering with other technologies, and found that whilst there are many similarities, the –

often critical – frames of geoengineering as a technical fix and as a response to emergency stand out as less typical. The analysis in this paper confirms the prevalence of the technical fix frame, and that it is controversial.” (Markusson, 2013, p. 21). The reason the fix frame is so controversial is because simple machines like levers and thermostats are employed to describe a much more complex system that is Earth’s climate. One study looked at the “mechanistic world view” frame but this should have been probably called the fix frame (Luokkanen, Huttunen & Hilden, 2013, p. 8). This is because its frame “builds on the concept of a machine or machine-like properties: *earth is like a machine and interventions on earth are like interventions in a machine’s mechanism*. Mechanistic metaphors “propose to look at the climate interventions as understandable and controlled phenomena” while they can also conversely emphasize “the complexity of the climate system highlighting the risk of simplistic solutions” (p. 8).

The People Frame

The people frame was another lens this research decided to look through. Discerning frame types helps one track this flow of power as it reacts with the media and audiences. O’Neill and Smith summarized the recent studies on the visualization of climate change in the media (p. 77). They found the most used frame was that of people¹⁶. Interestingly, people associated with geoengineering “Ken Caldeira, Bala Govindasamy, Edward Teller, Lowell Wood, and Michael MacCracken” (Nerlich & Jaspal, 2012, p. 136) also mentioned were “David Chandler, Nicola Jones, Paul Crutzen, and David Keith” (p. 132) did not get a specific frame in some studies. This

¹⁶ O’Neill and Smith found the next used frame was “causes of climate change (such as through iconic images of ‘smokestacks’),” and lastly “climate impacts at home and abroad, and graphical or scientific representations of climate change” (p. 77). It is also interesting that they found climate mitigation techniques such as geoengineering “depicted only rarely, or are notably absent: less than 7% of coverage in UK, Australia, or US newspapers pictured adaption or mitigation, and only 5% of images depicted green technology in the Canadian study” (p. 77).

“Geoclique...a group of male, middle aged and Caucasian earth system scientists, whose dominant influence in the geoengineering debate has been documented” and possibly “the power to employ technologies with global consequences could lie in the hands of a few” (Porter & Hulme, 2012, p. 343). Also Nerlich cited Buck stating, “This is a pretty interesting situation, where a small group of people has power to really frame a topic, at least in the mass media or traditional press” (Nerlich & Jaspal, 2012, p. 136). This is because they are the ones who frame the debate and “for a wider public audience these complex issues are new” (Luokkanen, 2013, p. 2). This is not the case for climate change media coverage of, for example, “politicians, ...scientists, citizens, business leaders, and celebrities” who were the most abundant frame type (O’Neill & Smith, 2014, p. 77). The overarching reason this research on the visual framing of climate change is important is because “inherent in any discussion of communication is the concept of power: who produces texts; for whom; why, and when? The repetition and normalization of particular types of visual imagery (or image absence) manifests power for some voices (and not others)” (O’Neill & Smith, 2014, p. 84). Research from the 90’s stated “the more alarming aspect of the results of this study is that, relatively speaking, scientists left the debate as it heated up” (Trumbo, 1996, p. 281). Another example is John F. Kennedy and his last speech about the limits of weather prediction, dangers of weather modification, and need for long term international cooperation in a speech given to scientists here are a few quotes:

Fourth, I would mention a problem which I know has greatly concerned many of you. That is our responsibility to control the effects of our own scientific experiments. For as science investigates the natural environment, it also modifies it, and that modification may have incalculable consequences for evil as well as for good.

And,

To deal with this problem, we have worked out formal procedures within the Government to assure expert review before potentially risky experiments are

undertaken. And we will make every effort to publish the data needed to permit open examination and discussion of proposed experiments by the scientific community before they are authorized (Kennedy, 1963).

This example is important because many researchers have codes and frameworks for things that are in the frame but how should you code for things that are excluded from the news like Kennedy's weather modification warning? Another people frame example that has got a lot of media attention includes, "We can choose to believe that Superstorm Sandy, and the most severe drought in decades, and the worst wildfires some states have ever seen were all just a freak coincidence. Or we can choose to believe in the overwhelming judgment of science — and act before it's too late" (President Obama, U.S. Global Change Research Program, 2014).

The Impacts Frame

This frame was taken from major findings in the visual framing of climate change research. Smith and Joffe relied on visual thematic analysis of newspaper images in the United Kingdom from January 1, 2000 until December 31, 2006 for its research method (p. 651). There were six newspapers studied in total, three "highbrow" and three "lowbrow" (p. 650 & 651). The authors of the study picked the specific sample "based on being most read according to the Newspaper Marketing Agency" and enabling "comparison between 'highbrow' and 'lowbrow' viewpoints" as well as including "a broad spectrum of political editorial style" (p. 651). As Smith and Joffe noted but probably has changed since then, "there are no online databases cataloguing visual images in newspapers" so Lexis-Nexis was used to round up the images by using the key words "global warming" OR "climate change" OR "greenhouse effect" appearing in the headline or major mention (p. 651). It is entirely possible that this method leaves out images that the word search does not catch. In the end 300 newspaper articles were sampled (208

broadsheets and 98 tabloids) with 60% of the articles having more than one image (p. 651). No mention of the total number of images processed was included in the analysis beyond “over 200 photographs” (p. 650).

The two main research questions Smith and Joffe asked were, “what is the visual content of recent climate change coverage in British newspaper press” and “how do broadsheet and tabloid newspapers differ in their inclusion of climate change images” (p. 650)? The deductive coding in this visual content analysis operationalized the images into key themes first developed by the Intergovernmental Panel on Climate Change (IPCC) (Smith & Joffe, 2009, p. 651). These “deductive” themes included cause, impact, and/or solution (p. 651). In order to get a “more fine grained analysis” inductive codes were included that broke the initial codes into more exacting categories, for example coding an image “local” when looking at an “impact” image (p. 651). Other qualitative coding categories explored include personification of climate change as depicted in the “affected public” theme where we see people up to their knees in water for example (p. 653 & 654). The results of Smith and Joffe’s quantitative analysis points to the fact that more than 50% of the articles had images that depict an “impact” and “significant differences are evident between newspaper types with broadsheet images more frequently depicting “impacts” than tabloid images (p. 652). This focus on the impacts of climate change was important to the authors because compared to “textual newspaper coverage” images are more “definitive” or in other words pictures don’t lie (p. 652). For example the authors noted that besides images of melting ice “numerous polar bears” were pictured with a “sense of futility” (p. 653). Also melting ice does not inform the public about the mechanism of climate change, just the effects. This is especially true because the public and the scientists are skeptical of climate change models. For example one study showed that only 19% of scientists interviewed “thought

they did a good job of modeling what sea-rise levels will look like fifty years hence” (Silver, 2012, p. 385).

Despite the possible shortcomings it is a great first attempt since as the authors said, “Whereas numerous investigations have explored climate change content at a textual level, there is a surprising lack of empirical work on images accompanying newspaper articles” (p. 648). This bit of wisdom is one of the main drivers in formulating this paper’s recommendations for future content analysis studies.

The role of the visual, according to Smith and Joffe, does not follow a direct effects model. Instead the authors stated its importance came from the images “ability to arouse emotion making it an effective medium for the social construction of risk messages” (p. 647 & 648). Since “there has been a considerable increase in the quantity of both textual and visual climate change information in the media” especially in the “British press when compared to other forms of British media” it warrants further investigation.

Content Analysis and Climate Control

This section summarizes the literature about climate control using the content analysis methodology. One way content analysis is now being extensively used is for tracking climate change (which is related to climate control) messages categorized by specific themes. By looking at all the messages as a whole (longitudinally or as a cross-section) researchers are able to hypothesize why certain people are alarmists or skeptics based on what messages were getting flooded into the public psyche at a certain time in history. These empirical results can also reflect the significance of certain events in climate change history in order to observe when articles, sometimes translated as interest, ebbed and flowed. This research conducted a content analysis

on news articles (specifically focusing on its visuals and major parts of text) regarding climate control in *The New York Times* and borrowed from research such as a study by Koteyko, Thelwall, and Nerlich entitled “From Carbon Markets to Carbon Morality: Creative Compounds as Framing Devices in Online Discourses on Climate Change Mitigation” which performed quantitative and qualitative content analyses of creative compounds used as linguistic framing devices found on the Internet from 1990 to 2008 (2009). Also known as carbon compounds, these communication tools help frame the climate change discourse and the authors mapped them using cybermetrics and critical metaphor analysis. This method allowed them to record the voices of those active in the debate over time and discourse dimension. With these data on carbon compounds the researchers were able to monitor the different stakeholders. For example fossil fuel interests by their use of creative compounds like “carbon economy” (2009, p. 26).

The theory this article expounded upon was framing defined as “the central organizing idea for news content that supplies a context and suggests what the issue is through the use of selection, emphasis, exclusion and elaboration” (Koteyko, Thelwall, and Nerlich, 2009, p. 27). Creative compounds can be used to create “discourse roadmaps” and Koteyko and others proposed this would open up new ways of analyzing the framing of climate change mitigation initiatives in the public sphere (2009, p. 25). This article was a “novel” contribution based on many different branches of research which included the analysis of issue cultures, issue networks, media hypes, and the study of metaphors besides the already mentioned study of media frames (2009, p. 27). The article did not ask any explicit questions or hypothesis besides when, where, and how many times did these creative compounds occur during the course of Internet discourse. By keeping track and graphing these compounds Koteyko and others were able to track the climate change discourse over time. This article contained graphs and frequency

tables but no statistics.

By synthesizing the literature reviewed regarding the visual framing of climate control in the media a few research questions were developed:

1. What is the most and least occurring frame?
2. Do the frames occur more or less over time?
3. Is the Downs Issue-Attention Cycle present?

CHAPTER THREE

METHODOLOGY

For this study a coding instrument was developed to facilitate the content analysis of *The New York Times* from 1851-present (see Appendix A). The sampling of the images of climate control was conducted via ProQuest Historical Newspapers: *The New York Times*, 1851-2010 & 1980-present databases. The advanced search function was used to search specific dates representing the three cycles (1851-1940, 1940-2006, 2006-2014). The search words included, “climate control,” “climatic change,” “climate change,” “climate warfare,” “geoengineering,” “rainmaking,” “weather control,” and “climate modification.” If a cycle did not respond to a certain search word(s) the next search word(s) was used until 25 articles from each cycle were selected. The “relevance” function was selected in the advanced search menu and when one search stopped producing relevant articles the next was entered.

Rational For Including Articles Searched

Some articles were discounted if they did not reference the weather or climate. For example some articles focused on the banking “climate,” alumni “control,” or liquor “control” and were off topic since they did not include ideas relating to the environment. Other articles talked of controlling the climate of a room with stoves or air-conditioning devices and were included since these were examples of climate adaption. Articles mentioning birth control, population control, and genetic control were included if they came up in the search since they have been framed as both having an effect on the climate or getting affected by the climate. For example scientists have expressed their views in the media which include ideas such as

“population growth is obviously a key component of projections of carbon emissions at a global level” (Murtaugh & Schlax, 2008, p. 14) and the “alteration of climatic *patterns* seems a more probable and perhaps more imminent consequence of the very unevenly distributed impacts of civilization’s use of energy” (Holdren & Ehrlich, 1974, p. 288). Since this content analysis looks at the manifest content audience perception at a certain point in time does not need to be considered. So an article with a picture of Margret Sanger would be included since it has to do with population control.

Two coders coded the images. I coded all the images and developed a set of coding rules for a second coder who coded at least 20% of the images. The second coder was trained and coded images independently from the primary researcher. The overall intercoder reliability was $\kappa = .664$ which indicates fairly good agreement between coders (for the individual frames, Cohen’s κ was .722 for the war frame, .723 for the fix frame, .559 for the people frame, and .653 for the impacts frame). Cohen’s κ is appropriate when two binary variables are measured by two coders measuring the same thing. Cohen’s κ measures the percentage of data values in the main diagonal of the crosstabulations table and then adjusts these values for the amount of agreement that could be expected due to chance alone (see <http://www.pmean.com/definitions.kappa.htm>).

Photographs, cartoons, graphs, or other visual images associated with a sampled article were coded separately and each image constituted a unit of analysis. An image could have components of any or all of the four frames (the war frame, the fix frame, the people frame, and the impacts frame). Some articles contained several images. Each image was coded along the four frames previously discussed.

The coding instrument included basic coding management items such as instrument number and coder identification (coder 1 or coder 2). Additionally, the date, page number, article title, and image positioning on the page were all coded in case we ever had to go back to an image for additional coding. Page positioning was coded along vertical (1-above the fold, 2-on the fold, 3-below the fold) and horizontal dimensions (4-left, 5-middle, and 6-right). The four frames were composed of several items.

The War Frame. The war frame highlights the militaristic origins of climate control or desire to tap into the energy of the military. This frame is made of eight components, each coded as either visibly seen (yes=1) or not seen in the picture (no=0). These include 1) military equipment—this frame element included the manifest depictions of ships, bombs, airplanes, satellites, trucks, tanks, radar or missile/radiation detection computer systems, or any physical items military personal use while soldiering. 2) Military personnel—are labeled as soldiers, technocrats, geoclque members, generals, military advisors, or soldier scientists. Military uniforms are an indicator but science soldiers can be identified by having a crew cut hair style, wearing a white shirt with black tie, carrying a three ring binder, pocket protectors or identified in text within the image. They may be seen observing the weather, gathering samples or data from the Earth, installing or repairing weather equipment, or entering outer space.¹⁷ The Signal Service which later turned into the U.S. Weather Bureau originated in the Secretary of War's jurisdiction (National Weather Service, 2015). Also climate modeling was sponsored by the Office of Naval Research and is still to the present time (CLIVAR, 2015). 3) Military symbols—

¹⁷ For more information on the geosciences role in the creation of the surveillance state see Turchetti and Roberts' book *The Surveillance Imperative: Geosciences During the Cold War and Beyond*. Turchetti was contacted during this research and he said he thought the militaristic or war framing of climate change was interesting and was writing a book on the topic.

this element includes recognized seals past and present (U.S. Department of Defense, 2015; U.S. Army, 2015). 4) Military titles— anytime one of the names listed is visible in an image it helps signify a war frame including Navy, Air Force, Department of Defense, Office of Naval Research, armed forces, RAND Corporation, JASON, MEDEA, American Geophysical Society,¹⁸ M.I.T. (Massachusetts Institute of Technology), and United Nations. These organizations all have militaristic origins or collusion and were fundamental in the beginnings of climate change theory development. 5) Military effects— words like kill, deploy, operation, rationing, food shortage, and famine all surround war time results. These ideas and words occur during or after times of war. They are the effects of war. Anytime a death occurs because of violence and is visually represented this frame element is present. Death might be depicted with a grave stone, contorted bodies lying on the ground, or numerical figures within the image signifying a death count. Deploy and operation are words to look for in the image although a group of soldiers exiting a piece of military equipment could signify being deployed. Rationing, food shortage, and famines are visually symbolized with images of empty grocery store shelves, starving people who are skin and bones, and dried up crops. 6) Military action— if words like war, fight, weapon, combat, battle, or propaganda appear in the image it triggers this frame element. These ideas and words occur during the war. Fighting the climate looks different than fighting a human enemy. It is difficult to attribute visual actions to fighting the climate since virtually all actions like a butterfly flapping its wings (Ross, 1991, p. 195) have some effect on the climate battlefield. Therefore unless some cartoonish depiction expressly shows a human battling Old Man Winter, Mother Nature, Zeus or some other symbolized depiction of nature or climate (while using old fashioned battle techniques like hitting or shooting) these images are what

¹⁸ The American Geophysical Society was created by the National Research Council which was created for specific military purposes during WWI (Turchetti & Roberts, 2014, p. 1).

signifies this war frame element. 7) Military catastrophe— if any of these words including catastrophe, doomsday, Dr. Strangelove, Cold War, atomic bomb, Star Wars, or nuclear winter were written in the image this war frame element gets selected as being present. Star wars, environment, fight, food shortage, famine are all words that surround the war frame at the end of the second cycle and beginning into the third cycle according to historical accounts from Hamblin, Fleming, and Weart. 8) Weather weapon— if the words “weather as a weapon” or “environmental warfare” or representations of this are present in the image it signifies this war frame element is also present. An early example could include an image of Zeus with a thunder bolt. A later example includes a technocrat grasping levers connected to the seasons as depicted on the front page of *Collier's* magazine on May 28, 1954.

The Fix Frame. The fix frame has to do with mechanistic and simple technical descriptions of climate control. This frame is made of 14 components, each coded as either visibly seen (yes=1) or not seen in the picture (no=0). These include 1) geoengineering symbols—for example a clock, thermostat, switch, dial, lever, sunshade, sunglasses or sun umbrella, tools or objects as symbols for geoengineering. These images are visual metaphors that represent a more complex subject. For example an image of the Earth (a circle colored blue and green in the shape of the Earth's continents and oceans) personified and with a thermometer in its mouth symbolizes the greenhouse effect which is a form of geoengineering. A picture of a fan spinning and cooling the earth down represents geoengineering as well. 2) Micro-climate & adaptation— for example images of people traveling to better climates, air conditioners, humidifiers, stoves, shelters, dams, clothing, fans, ice, and other device which controls the micro-climate in a certain area. 3) Science visuals—these include graphs, charts, and data tables or figures. Line graphs with an x and y axis is the classic example. Pie charts, spreadsheets, and

other methods to visually display information are included in this frame element. 4) Earth on a grid—this element is present anytime an image of the Earth is represented as digitized or juxtaposed with grid lines. The computers used in climate models break the earth down into small grids. This process is visually portrayed when the image of the earth is shown with a grid pattern transposed over the top of it. This symbolizes machines predicting weather. 5) Climate control equipment— this element is present anytime an image contains green technology or geoengineering technology pictured as planes, supercomputers, dams, levees, satellites, ships, olivine or equipment to crush it, earth moving equipment, carbon sequestering devices, and carbon emitting devices. This fix frame element includes images of windmills, biofuel production facilities, solar panels, grid systems, algae bioreactors, fuel cells, geothermal reactors, nuclear reactors, tidal mills, electric cars, geoengineering equipment for enhanced weathering, smoke stacks, exhaust pipes, and stratospheric aerosol injection equipment. The tools in this category are manifest and actual, whereas tools in the clock, thermostat, and switches category (#9) are visual metaphors for a more complex subject that they crudely represent or signify. 6) Climate insurance— flood, tide, and crop insurance is visually signified with words like “insurance policy” or a picture of an insurance contract. A way to fix the climate is to set up human systems like insurance that can mitigate the damages from a bad climate. For example a hail storm on a crop of corn may be used to visually symbolize crop insurance. 7) Climate uncertainty— this variable is present anytime the words man not understanding climate, baffled, uncertainty, perplexed, or mystery are present in the image. This element is visually portrayed with a person scratching their head or an image of a question mark that appears floating above someone or something. 8) Climate tweak— this element is present when an image of the words tweak, turn down, adjust, tune up or tune are present within the image. Also this element is

visually portrayed when an image of a knob or some other physical control function like a button or computer screen is connected to the Earth's climate system. Words like hacking the climate and heat engine also trip this element if they are visually manifest in the image. Furthermore if the climate is likened to a car engine with words or images of a car's hood open that is included as well. 9) Climate fix— this element is present when the words “fix,” “fixing the sky,” “fixing the weather,” “fixing the climate” or “fix” is present somewhere in the image. This can be visually portrayed with an image of a carpenter or mechanic with tools who is working on a visual representation of the Earth as they would be doing as a normal day's work. 10) Earth sickness— if the image of the Earth is portrayed with thermometer coming from its mouth that includes this frame element. The Earth lying in a bed or being attended to by a doctor or nurse also trips this element. Doctors and nurses are visually represented with a red cross symbol on their clothes, white clothing, a reflector on their head, or the image of a needle or syringe. 11) Weather control— if the words rainmaking, fog dispersal, weather control, or cloud control are present in the image this frame element is present in the image. 12) Indirect climate control— if women's rights programs associated with the United Nations are visually present in the image this element is present. Words like population control, overpopulation, and birth control signify this frame element. 13) Man controlling climate—if a person or entity is visually depicted as somehow changing or altering the climate (on a micro or macro level) it fits this category. Examples of a micro level change include someone holding an umbrella (see variable 10). If this umbrella happens to be shaped like a volcano (which is supposed to signify stratospheric aerosol injection i.e. chemtrails) and its particles are blocking the sun's rays this signifies change on a macro level and also symbols of geoengineering (see variable 9). 14) Man understanding

climate— if the words “man understanding climate” are in the image it signifies this frame element is present.

The People Frame. The people frame highlights humans, specifically scientists, climate victims, climate villains, celebrities, and organizational leaders. This frame is made of 10 components, each coded as either visibly seen (yes=1) or not seen in the picture (no=0). The first element in this frame was variable 1) climate control politics—this element was present when portraits, cartoons, or photographs that represented specific key figures in climate control politics were present (also if their name is present in the image this element was selected). Key figures in climate control politics included Al Gore, Rajendra K. Pachauri, Gro Harlem Brundtland, Ban Ki-Moon, George Bush, George Bush, Vannevar Bush, Barack Obama, Wen Jiabao, John Kerry, Hillary Clinton, Sergio Serra, Jake Schmidt, Yvo de Boer, Joseph Bast, James Taylor (Heartland Institute not the singer), Robert Orr, Michael Levi, Angela Merkel, Jacob Zuma, Luiz Inacio Lula da Silva, Manmohan Singh, Denis McDonough, and Robert Gibbs. 2) Climate control cartoons—if cartoons or animations are present in the image this frame element is present. Cartoons, drawings or animations differ from photographic derived images for this element. 3) Climate scientist—a climate scientist is considered someone who has published a peer-reviewed paper regarding climate in a geophysical journal. They are almost always connected with a university, support the greenhouse effect theory and have high confidence in computer generated climate models. For example if any of these names or likenesses are present in the image this variable is triggered: Ken Caldeira, Bala Govindasamy, Edward Teller, Lowell Wood, David Keith, Michael MacCracken, Nicola Jones, Carroll S. Wilson, Ken Caldeira, Bala Govindasamy, Edward Teller, Lowell Wood, David Keith, Michael MacCracken, Nicola Jones, James E. Lovelock, Howard J. Herzog, J Roger P. Angel, Martin I. Hoffert, John Lantham, or Nadine

Unger. 4) People predicting climate—this category is visually depicted with images of witchcraft (women riding on brooms, wearing black clothes and a pointed hat), wizardry (wizards have long beards and wear a cloak), and crystal balls. Famous people in history who have predicted disasters may also be invoked. If the words predicting or prediction are present this element is present. 5) Climate celebrity—this category includes movie stars, television stars, or popular musicians. Famous artists can also be in this category. Any person who has a large following and is recognized by strangers on the street for example Leonardo DiCaprio and Brad Pitt is included in this category. These people should be famous for something other than being a climate expert or a science authority. 6) Climate civilian—images of people other than climate scientists, celebrities or politicians fit this category. 7) Climate scientists traveling—this frame element is identical to frame element 25 except this category shows action. For example climate scientists with suitcases or riding in a plane would trigger this category. 8) Physicist or scientist—this category visually depicts non-climate scientists who also practice science. This category is signified by the words “physicist” or “scientist”. A person with wild hair, white lab coat, and beakers with liquid visually depict a scientist. 9) The God frame—this category visually depicts images of God, Mother Nature, Old Man Winter, Zeus, Poseidon, various rain gods or Thor. This frame is triggered by the words “God,” “god,” or the names of the deities just mentioned. God is sometimes depicted as wearing flowing white robes, sitting on a cloud, and having a long white beard. 10) People Controlling Climate —this category is the same as frame element 21 although it is focused on the people versus the control.

The Impacts Frame. The impact frame looks at how climate change effects are thought about and portrayed. This frame is made of 12 components, each coded as either visibly seen (yes=1) or not seen in the picture (no=0). Frame element 1) climate emergency—was present

when people were shown in precarious situations. For example a person holding on to a branch while running water is trying to carry them away is included in this element. People having looks of distress on their face is also included. Looks of distress included frowns, crying, or screams associated with an open mouth. Another way emergency is portrayed is with emergency equipment and personnel on the scene. The scene is usually depicted as being in disorder for example heavy flooding, debris, or upside down cars and houses. Melting ice which is images of ice and water next to each other is also considered an emergency. 2) Landscapes and objects negatively affected—this frame element is consistent with frame element 33 except there are no people present. Before and after images showing differences are included in this image. 3) Animal emergency—this frame element is the same as element 33 except instead of people in trouble animals are in unusual circumstances. For example a polar bear might be sitting on a small chunk of ice or scenes with dying animals or fish. 4) Polar bears—if a polar bear is present this frame element is present. A polar bear is white. 5) Landscapes not changing—since all images are stable this frame element is portrayed with before and after pictures where both images are nearly identical. 6) Civilians, climates or ecosystems affected by climate control—this frame element is present when people or landscapes are juxtaposed next to carbon emitting or carbon sequestering devices. 7) Ocean acidification—this frame element is present when a PH level is next to a sea depicting an ocean. This frame may also be present with a beaker that says “acid”. Also if the words “ocean acidification” are present in the image this frame element is present. 8) Storms—when people or landscapes are affected by storms this element is triggered. Trees or people bent over signify high winds which triggers this frame element. Other triggers include objects suspended in air or funnel clouds. High water, rain, and snow also signify this storm element. 9) Desert landscapes—this element is present if dry cracked earth is present. Also

images of sand piles, dead plants, or expanding deserts with before and after pictures make up this frame element. 10) Ice—if ice, glaciers, icebergs, or tundra is present this variable is present. Also if any of these words are present within the image it should be marked. 11) Floods—if running water is pictured where it usually doesn't run this frame element is present. For example if water is running across a road or through a building this includes the floods frame element. 12) Civilian positively affected by climate control—this frame element is present when smiling faces are next to carbon dioxide emitting or carbon dioxide sequestering devices. Together each of the frame elements mentioned contribute to signify whether a frame is present or absent.

Analysis

To help answer the research questions quantitatively, SPSS data analysis software was used. Research question one requires that the SPSS COMPUTE statement be used first to form a composite variable that includes all the components of each frame. For frame one, the war frame, there were eight components (military equipment, military personnel, military symbols, military titles, military effects, military actions, military catastrophe, and weather weapon) which were added together to create a new composite variable for the military frame. The FREQUENCIES routine was used to determine the descriptive statistics for each frame. The means calculated from the FREQUENCIES routine is used to answer the Research Question 1. The new war frame variable could range from 0 to 8. The same procedure was done for frames two, three, and four. Frame two, the fix frame, had 14 components. The composite fix frame variable ranged from 0 to 14. Frame three, the people frame, had 10 components. The composite people frame ranged from 0 to 10. Frame four, the impacts frame, had 12 components. The composite impacts frame ranged from 0 to 12.

To answer the second research question, an ANOVA routine was used to see if there was a significant difference between the frame means during the three cycles of time defined for this thesis (cycle one=1851-1940; cycle two=1941-2005, cycle three=2006-present) (see Figure 1). The Scheffe post hoc test was used to compare the means of the four frames over the three cycles. The Scheffe test is a popular post hoc test and is quite conservative.

To answer research question three, some visual data analysis was employed. SPSS's graphing function will be used to examine the trend in each frame over time. As the Downs cycle suggests, there should be fluctuation in portrayals of climate control over time in which there will be periods of many portrayals and periods in which there will be no portrayals. So, we should see peaks and valleys in the graphic display of the frames over time instead of a steady increase or decrease in portrayals.

CHAPTER FOUR

RESULTS

Research question one is, what is the most and least occurring frame? Using basic descriptive statistical procedures (SPSS Frequencies run) the means for each frame per image was determined (see Table 1.)

Table 1: Overall Frame Means Per Image.

<u>FRAME</u>	<u>N</u>	<u>MEAN</u>	<u>STANDARD DEVIATION</u>
War	146	.5137	1.02544
Fix	145	1.7517	1.34128
People	146	.9795	1.21183
Impacts	146	1.5959	1.50208

When combining all three cycles the frame with the highest overall mean was the Fix Frame (M=1.7517, SD=1.34128) indicating that it is the most occurring climate control frame per image. The frame with the lowest overall mean was the War Frame (M=.5137, SD=1.02544), meaning that it is the least occurring climate control frame per image.

Table 2 shows the means of the frames for each of the three cycles. In cycle one (1851-1940), the most occurring frame per image was the Impacts Frame (M=1.9245, SD=1.86928) which was interestingly an all-time high, while the least occurring frame per image was the War Frame (M=.6792, SD=1.22118). The Fix Frame was the most occurring frame in cycle two

(M=1.7273, SD=1.23909) and the War Frame was again the least occurring frame (M=.5818, SD=1.08339). Cycle three mirrored cycle one with the Impacts Frame once again having the greatest frequency (M=1.7105, SD=1.35383) and the War Frame occurring at an all-time least (M=.1842, SD=.39286).

TABLE 2. Frame Means During Three Cycles.

	Cycle 1 (1851-1940)	Cycle 2 (1941-2005)	Cycle 3 (2006-present)
Frame 1 (War)	Mean=.6792 SD=1.22118	Mean=.5818 SD=1.08339	Mean=.1842 SD=.39286
Frame 2 (Fix)	Mean=1.8846 SD=1.13161	Mean=1.7273 SD=1.23909	Mean=1.6053 SD=1.71700
Frame 3 (People)	Mean=.9811 SD=1.6834	Mean=.7636 SD=1.29047	Mean=1.2895 SD=1.11277
Frame 4 (Impacts)	Mean=1.9245 SD=1.86928	Mean=1.2000 SD=1.07841	Mean=1.7105 SD=1.35383

The second research question explores whether the frames occurred more or less over time. To answer this question a Oneway ANOVA analysis with the Scheffe post hoc test was used with frames being the dependent variable (see Tables 3 and 4). The results show that the frame means change from one cycle to cycle, but only the Impacts Frame had a significant mean difference between cycle one and cycle two (M= .72453, p= .042). The War Frame approaches the significance threshold between cycle one and cycle three with a mean difference (M=.49503, p=.075).

TABLE 3. Oneway ANOVA of Frames by Cycles.

		Sum of Squares	df	Mean Square	F	Sig.
Frame 1 (War) Groups	Between Groups	5.833	2	2.917	2.844	.061
	Within	146.640	143	1.025		
	Total	152.473	145			
Frame 2 (Fix) Groups	Between Groups	1.766	2	.883	.487	.615
	Within	257.296	142	1.812		
	Total	259.062	144			
Frame 3 (People) Groups	Between Groups	6.214	2	3.107	2.149	.120
	Within	206.724	143	1.446		
	Total	212.938	145			
Frame 4 (Impacts) Groups	Between Groups	14.844	2	7.422	3.398	.036
	Within	312.314	143	2.184		
	Total	327.158	145			

control. At first everyone is excited to solve the problem when they first hear about it. This excitement is signified by high news article frequency, but in the next stage people learn about how hard it is to control the climate, for example competing with natural forces and trying to intervene in third world development.¹⁹ After the realization of the daunting problem people go back to ignoring it and news article frequency about it dwindles out. With the Downs issue – attention cycle theory one would expect there to be fluctuations in the frame frequency over time in a kind of up and down manner and not in a smooth increase or decrease manner. In order to find support or not for Downs theory, graphs were constructed that measured frame frequency through time. If the graph looks like a gradual rise with no major valleys the theory is unsupported by the data collected. If the graphs look like Nevada’s terrain with basins and ranges the theory was supported.

¹⁹ Andrew Ross mentions this last challenge, “No one needs to doubt the urgency of the greenhouse problem to recognize that any Western suggestion of standards for the development of other countries is also a reinforcement of the long history of colonial underdevelopment of the non-European world” (Ross, 1991, p. 213).

FIGURE 1: FREQUENCY OF THE WAR FRAME OVER TIME.

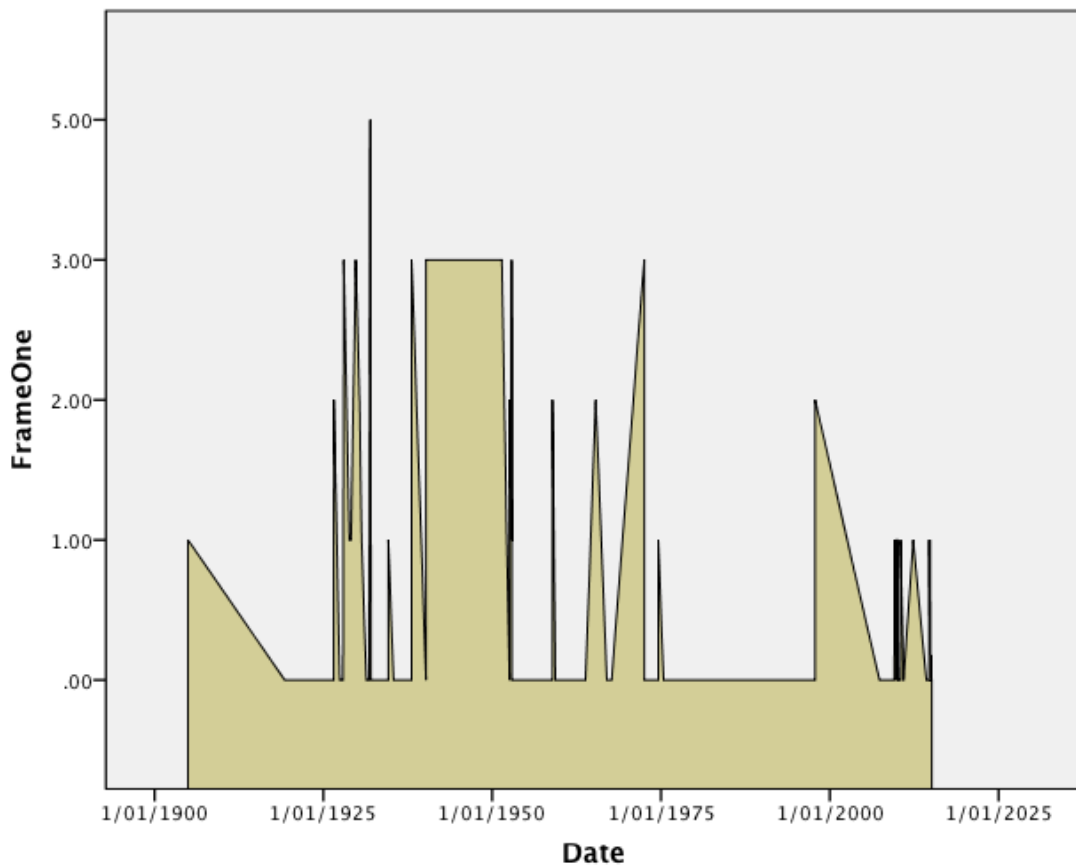


Figure 1. This graph corresponds with periods of relatively high war frame frequency followed by relatively low periods of war frame frequency. This lends some graphical support for the Downs issue-attention theory. Overall the shape is similar to a sawblade or mountain range and roughly correlates with major military events and relatively peaceful times. Although climate control articles were found before 1900 during the sampling of *The New York Times* they

were not measured since no visuals accompanied them. According to Robert Henson, a science writer at the National Center for Atmospheric Research,

As late as 1860, the *New York Times* carried no regular weather feature. It was the formation of the National Weather Service within the U.S. Signal Service in 1870 that paved the way for routine weather coverage in newspapers, and later in radio and television. Compiling telegraph data from across the growing nation, the government issued reports and “indications” (forecasts) and distributed these daily to newspapers. Within five years, the *New York Times* carried several column inches daily devoted to the weather... Joseph Pulitzer’s *New York World* founded the traditional weather “ear” at the upper-hand corner of the front page, summarizing the next day’s forecast. By 1900, the *New York Times* had followed suit with a front-page box giving forecasts and instructing readers to look inside for more details (Henson, 2010, p. 5).

This first step of observing the weather fits in with militarist J.O. Fletcher’s theory of scientific progression discussed earlier. The war frame began to track at a value of 1.00 around 1905 producing a small but wide mountain that lasted throughout World War I. This data supports Henson’s statements, for example

World War I provided a major step forward in weather forecasting and weather news treatment. Wilhelm Bjerknes,²⁰ a Scandinavian military meteorologist, discovered the presence of moving boundaries that separated warm and cold air masses. Using a wartime analogy, he labeled the boundaries “fronts,”...The

²⁰ Bjerknes was a Norwegian physicist who came up with the Primitive Equations that go into modern super-computer climate models.

discovery improved weather forecasts dramatically while adding a new element to the vocabulary of weather news (Henson, 2010, p. 6).

The coverage of climate control gradually receded to zero by about 1919 and stayed at that level for a period lasting about eight years. The lack of coverage coincides with the Roaring Twenties, a time of relative peace concerning U.S. involvement in major world conflicts. Maximum frequency peaked at level 5.00 around 1930, a time of high fluctuation between high frequency of visual war frame elements and low frequency of the elements. This could be partly explained by Henson who said “under FDR, the Weather Bureau stepped up its involvement with radio stations, forging a set of links between local broadcasters and local Weather Bureau personnel” (Henson, 2010, p. 6). Two valleys each lasting about three years signified no coverage which gave way to sustained high frequency levels manifest from around 1940 until 1955. Henson again provides some historical context, for example “the war effort had trained thousands of enlisted men in meteorology, many of whom came back ready to use their knowledge in civilian life” and “whether forecasts had made a critical difference in the outcome of such events as the D-Day invasion of Normandy” (p. 9). The years 1955 to 1960 contained little coverage of the war frame and also was a time of relative world peace (at least no hot world wars were happening). From 1960 to 1975 there was more war frame frequency compared to 1955 to 1960. This former time period coincides with secret military weather modification programs such as Operation Pop Eye carried out in Vietnam (see page 22). From 1977 until 1999 no images sampled contained elements from the war frame. This time period consisted of a large non-event, that is a time of no major world wars. Around the year 2000 until the present the data signal registered war frame frequency similar to what was happening around World War I. President Obama’s recent cover blurb on the September 8, 2015 cover of *Rolling Stone* magazine

fits the war frame theme since it framed climate change as a “Crusade.”

FIGURE 2: FREQUENCY OF THE FIX FRAME OVER TIME.

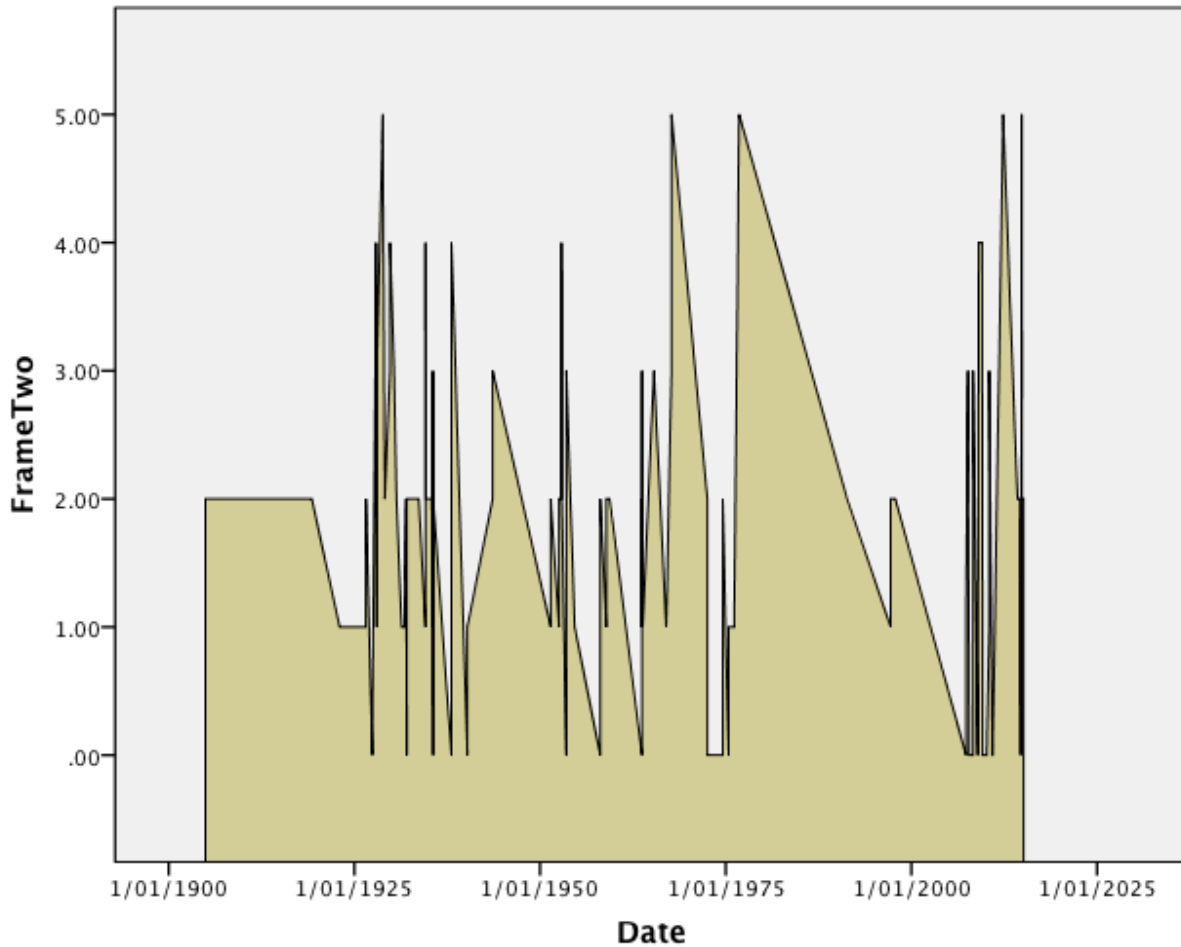


Figure 2. Overall the fix frame is quite different compared with the war frame since the fix frame was present in the images almost constantly throughout the entire time measured (besides a few zeroes during three periods of fluctuation). This frame does not support Downs issue-attention theory since coverage did not totally die out. One can also identify three solid mountains that contained twelve or more years without a fix frame frequency reading of zero. Since the fix frame is made up of science related elements (for example images of graphs, Earth from space, material technology, and tools as symbols for geoengineering) one might expect to

find a correlation between the latest scientific events and frequency of coverage regarding the fix frame. One possible explanation for the visual coverage of the fix frame starting in 1904 at a frequency level of 2.00 and lasting for more than 12 years without fluctuating is the introduction of weather fronts (described above in Figure 1 description), increased communication lines spurred on by World War I, and “in 1900, the Weather Bureau subsidized an experiment to test whether sending vocalized messages by radio was feasible” (Henson, 2010, p. 6). These scientific events would have given journalists images and information they could use in articles although this is only speculation. By 1925 the frequency dropped to a level of 1.00 and then fluctuated to 5.00 by 1930 and then bottomed out a number of times during the late 1930’s and early 1940’s. This time of high fluctuation matches up with the Great Depression a time when money for experiments and military spending was relatively low. Then from about 1945 to 1955 frequency stabilized at a level of 2.00. Although it could be a coincidence or part of another explanation it does line up with increased military spending for weather related experiments which could have translated into more things for reporters to report. From 1955 to 1975 fix frame frequency was sporadic although a 10 year span of coverage is present around the time of the Vietnam War. Although, the introduction of climatology discoveries resulting from the Cold War (Turchetti & Roberts, 2014, p. 1) goes against the idea that military spending and scientific discoveries also increases fix frame frequency. Just following 1975 fix frame frequency increases significantly possibly because “satellite pictures became an integral part of local weathercasting starting in the late 1970’s with Geostationary Operational Environmental Sateleites (GOES)” (Henson, 2010, p. 92). By around 2006 fix frame frequency was on the decline but late in cycle 3 it began to rebound. This is represented by *The New York Times* special series called “The Big Fix” which was a “series of articles examining potential solutions

to climate change” (Gillis, 2014, A1). During the three cycles frequency was relatively constant yet marked by periods of stable frequency followed by periods of fluctuating frequency.

FIGURE 3: GRAPH OF THE FREQUENCY OF THE PEOPLE FRAME OVER TIME.

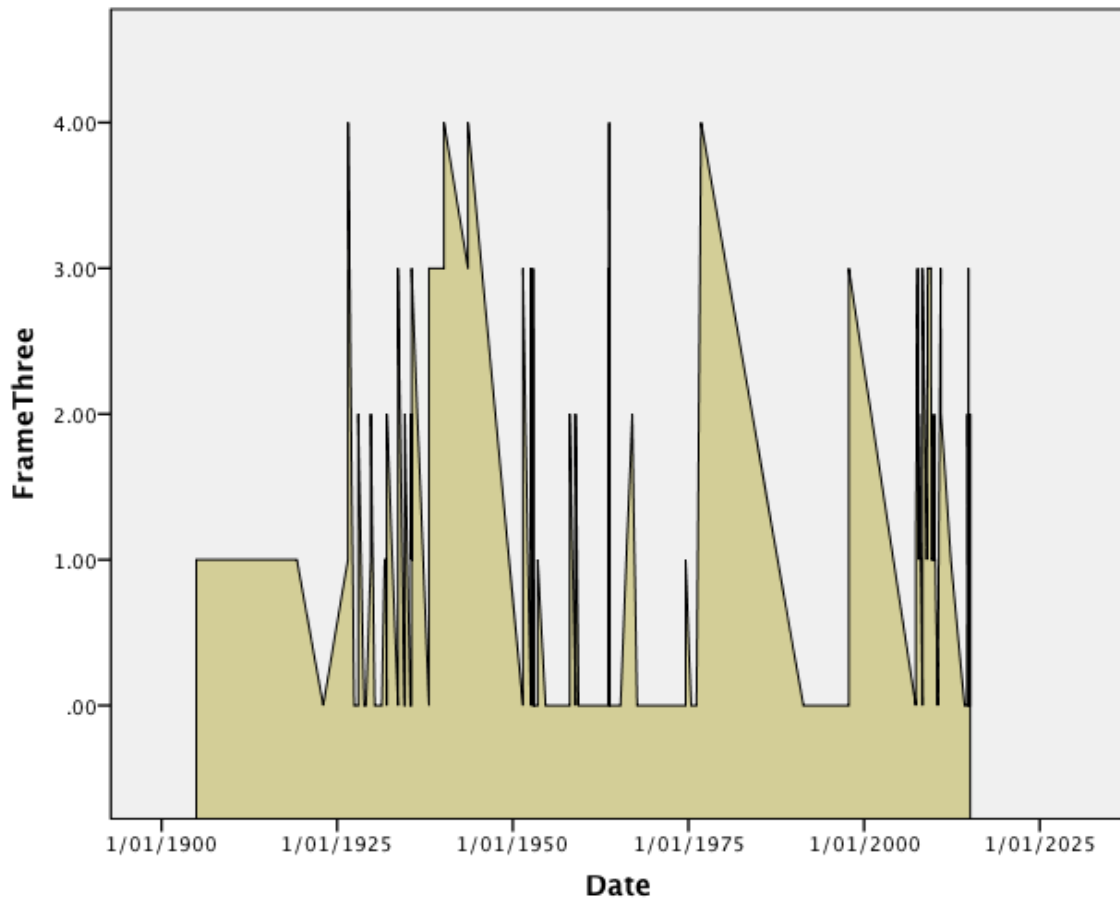


Figure 3. The people frame is more like the fix frame in terms of periods of stable frequency followed by times of fluctuating frequency. Since times of no coverage were prolonged, support for Downs issue-attention theory is present. The people frame frequency looks almost identical to the fix frame in the years 1904 until 1925. This was a time when many scientific organizations were formed including the American Meteorological Society founded in 1919 (Henson, 2010, p. 13-14) and the American Geophysical Society founded during World

War I (Turchetti & Roberts, 2014, p. 1). A possible explanation is that journalists included leaders of organizations in the news articles especially when these important entities were just forming. From 1925 until the late 1930's the frequency of the people frame fluctuates from narrow valleys in the zero range up to eight peaks in the 2.00, 3.00, and 4.00 range. The years around 1939 to about 1955 produced sustained people frame frequencies in the 3.00 to 4.00 range that did not fluctuate compared with the people frame frequencies within the years around 1955 to about 1978. During this later time 10 peaks formed at the 1.00-4.00 levels and 10 valleys happened at the zero level. The 1980's witnessed frequent coverage of the people frame which correlates with "the summer of 1988, when NASA scientist James Hansen testified before Congress about the increasing evidence of global warming" (Wilson, 2002, p. 249). This was bolstered by George H. W. Bush who said, "Those who think we are powerless to do anything about the greenhouse effect forget about the 'White House effect'; as President, I intend to do something about it" (Henson, 2010, p. 190). Furthermore, "Bush joined nearly all other world leaders in signing the United Nations Framework on Climate Change, which was ratified by a two-thirds vote of the U.S. Senate in 1992" (p. 190). While late 1990 into early 2000 represented a valley considering this frame which matches prior research that also found "global warming reaches a peak in the late 1980's and falls afterwards, as documented in McComas and Shanahan (1999)" (Brossard, Shanahan & Katherine, 2009, p. 371). This is interesting since this is when the IPCC formed and issued its first report (Wilson, 2002, p. 247). Also "1989, 1992, 1995, 1997...were the dates of the global warming conferences in La Hay, Rio de Janeiro, Berlin, and Kyoto, respectively" (Brossard, Shanahan & Katherine, 2009, p. 371). Around 2000 another people frame frequency peak emerged but then receded by 2005. The period from 2005 until the present represents high fluctuation regarding the people frame. During this period the people

frame is present since no valley of zero abounds as it did during the 1990's. On Friday September 25, 2015 *The New York Times* article *U.S. Says China Will Announce Cap-and-Traded Emissions Plan* by Julie Hirschfeld Davis and Coral Davenport displayed an image of Chinese President Xi Jinping on the cover. The article which continued on page A6 featured another people frame image since President Obama and Xi Jinping were depicted walking together. Above this image there were three more images of President Xi Jinping. This people frame explosion covers the entire page and reads more like a biography focused on values compared to a detailed scientific description of climate control.

FIGURE 4: GRAPH OF THE FREQUENCY OF THE IMPACTS FRAME OVER TIME.

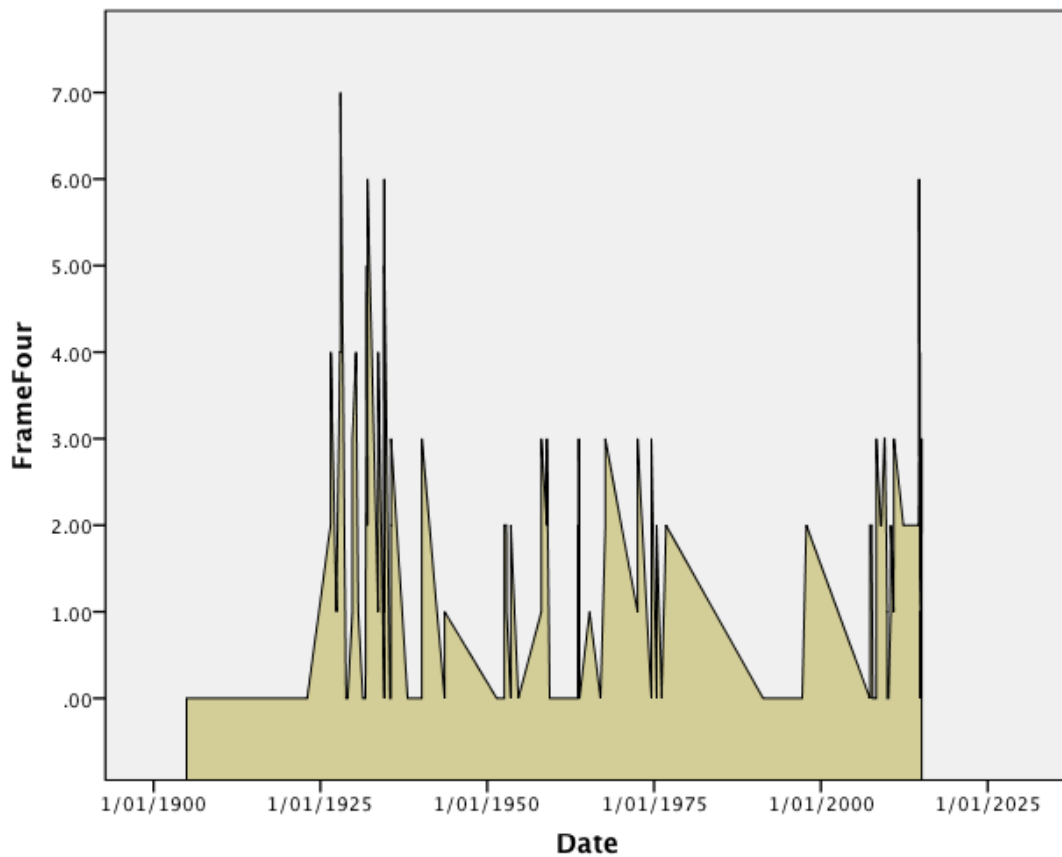


Figure 4. Overall the impacts frame frequency looks somewhat similar to the war frame graph since periods of zero are prolonged. This supports Downs issue-attention theory which holds “public perception of most ‘crises’ in American domestic life does not reflect changes in real conditions as much as it reflects the operation of a systematic cycle of heightening public interest and then increasing boredom with major issues” (Downs, 1972, p. 39). Also the overall consistent nature of the fix frame does not represent the impacts frame since the impacts frame contains periods of sustained zero values and less big thick mountains. The impacts frame

frequency looks somewhat like a sawblade. The impacts frame starts off sluggish meaning it did not record an impact frame element in the images until about 1925. Speculating on the cause of this it is interesting to note that “from the 1890’s through the Great Depression, the word *tornado* could not be used in any Weather Bureau public statements” because “fear of panic and a distrust of rapidly improving communications systems seem to have dictated Bureau policy during these 50 years” (Henson, 2010, p. 151). This lack of communication proved deadly when the 1925 Tri-State Tornado killed 700 people (p. 151). Another example happened on September 8, 1900 when Galveston, Texas was hit by a hurricane and an estimated 8,000 to 12,000 people died (Henson, 2010, p. 148). Historical researchers contend “it took a record 21 tropical storms in 1933” and “the most intense tropical cycle to make landfall in U.S. history” in 1935 “to produce change” (p. 149). This is represented in the impacts frame graph because around 1925 until about 1939 high levels in the 7.0, 6.0, and 5.00 range that fluctuated violently were recorded. The frequency then decreased in magnitude and fluctuation rate until around 1970 at which time it began to increase. An explanation that could explain this is that “during the middle and late 1970s, the eastern United States experienced some of its most destructive weather in decades” (Henson, 2010, p. 16). From about 1980 to 1997 magnitude and fluctuation stepped down. Then from about 2000 until the present frequency increased as magnitude ranges stepped up again. This recent frequency increase rivals the high frequencies around the 1930s. Possible explanations include events surrounding El Nino (Sturken, 2001, p. 161), IPCC involvement concerning global warming, and Hurricane Katrina.

FIGURE 5: FREQUENCY OF THE FOUR FRAMES COMBINED OVER TIME

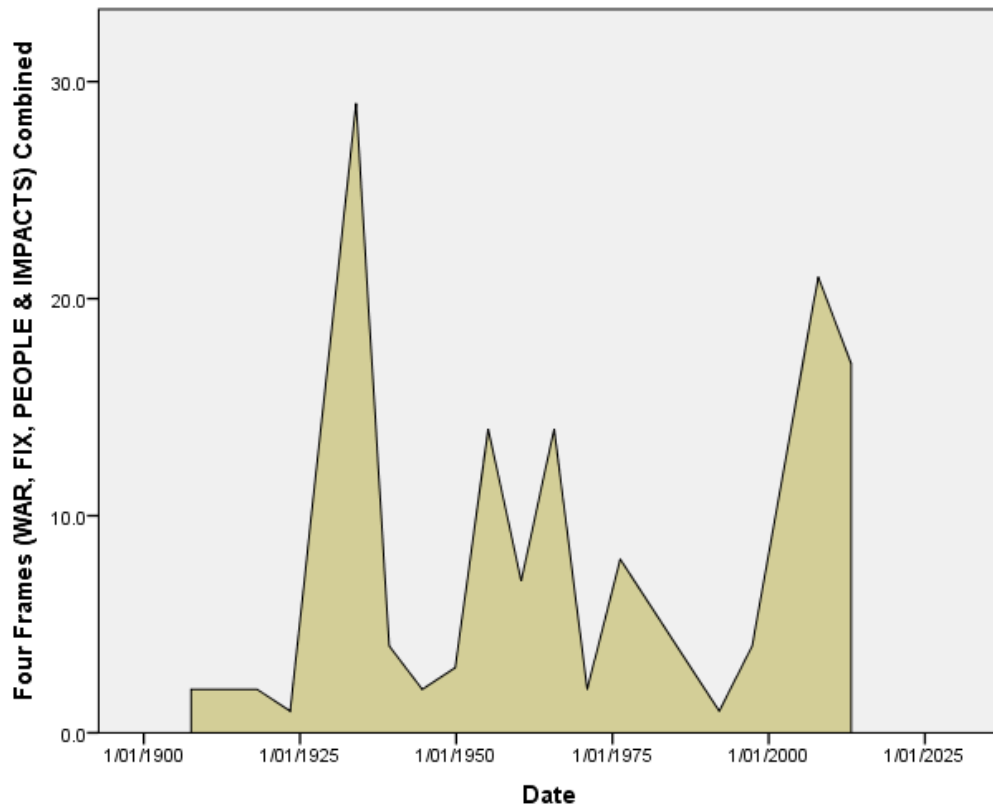


Figure 5: This graph shows the frequency of all four frames (war, fix, people, and impacts) combined through time. When looking at the data from this perspective one is able to find times of frequent frame element manifestation followed by times of infrequent presence. This up and down fashion captures three possible Downs issue-attention cycles (at least in terms of picture frequency in the *New York Times*). The first media cycle happens right after 1925 and correlates with increased activity regarding the formation of major climate control organizations and weather generated impacts. The 1940's witnessed a lull in media generated visuals regarding

weather control. The mid and late 1950's saw a dramatic rise in weather control visuals in the media followed by little coverage through the 1980's. The main question is whether or not today's spike in climate control coverage will continue at the 2006 increasing or 2015 decreasing rate? If we look at the past cycles we must conclude this spike is no different from the prior ones.

CHAPTER FIVE

DISCUSSION

This thesis explored the visual framing of climate control in *The New York Times* through three cycles of media history. Although no peer-reviewed study has explored this specific topic, a wealth of prior communication articles on both the visual and textual aspects of climate change and geoengineering in the media was reviewed in order to conceptual the frames used in this study. Once the visual frames of climate control (war, fix, people, and impacts) were defined, a content analysis was conducted in order to see which ones were most and least frequent generally and over time. Correlating the frames with events over time was speculative, but interesting and informative and can lead to further research. Another purpose of this research was to see whether or not the Downs issue-attention cycle theory applies to climate control.

Visual Climate Control Frames Past and Present

The war frame on average was displayed the least frequently in images of *The New York Times* concerning climate control over the three cycles measured. Furthermore, this frame was found less and less each cycle (over time). This was surprising since military involvement in climate control was expected to be a dominant frame. Also politicians from both ends of the spectrum have traditionally been supportive of climate control when framed as military involvement so finding that the media has recently shied away from this frame seems counterintuitive. For example during the Eisenhower administration the Sputnik “crisis” “drove

the government to boost funding for all areas of science” (Weart, 2008). Reporters framed this climate control development with a military perspective that is apparent textually in *The New York Times*’ article called *Warmer Climate on the Earth May Be Due to More Carbon Dioxide in the Air* (Kaempffert, 1956, p. 191). In the second paragraph of this article the reporters said this study was “made with the support of the Office of Naval Research” (p. 191). The article next to this one went on to explain an “arctic rocket site” where scientists were conducting “Geophysical–Year Experiments” (p. 191) which also framed climate control in a military category. A half-page visual is present next to both of these articles. It is a standalone cartoon depicting a Russian in a communist uniform. The caricature is expressing frustration as he attempts to fit East European countries back together as if he is trying to complete a puzzle. One could imagine the combined effect this media had on an audience. For one thing it made it clear why the United States was interested in spending money on climate control--they needed to have it before the Russians. Apparently this framing had the political will to fund climate control research. These early articles considering the greenhouse effect theory were very science heavy. They also discussed the economic implications of consuming “coal and oil” (p. 191). It would be interesting to see a poll registering the public’s perceptions of climate control during cycle 1 and cycle 2.

This military framing of climate control continued when conservative President Richard Nixon “supported the idea” of the creation of the National Oceanic and Atmospheric Administration (NOAA)²¹ (Weart, 2008). According to one prominent historian “from the

²¹ The military foundations of NOAA are apparent when looking at its website which says one of its roles is to “provide officers technically competent to assume positions of leadership and command in the National Oceanic and Atmospheric Administration (NOAA) and Department of Commerce (DOC) programs and in the Armed Forces during times of war or national emergency” (NOAA, 2015).

beginning, NOAA was one of the world's chief sources of funding for basic climate studies. For example, one of its units constructed what were arguably the most important of all computer models of climate” (Weart, 2008). Besides helping to support key climate control organizations Nixon was one of the first Presidents to go on the environmental offensive although his enemy was the “energy crisis” not the climate. (Nixon, 1974). In a 1974 radio address Nixon used a war analogy when he framed the energy crisis as:

The burden of energy conservation, of cutbacks and inconvenience, of occasional discomfort, continued concern is not, I can assure you, an artificial one. It is real. During the Second World War, Winston Churchill was once asked why England was fighting Hitler. He answered, "If we stop, you will find out." If we should choose to believe that our efforts in fighting the energy crisis are unnecessary, if we permit ourselves to slacken our efforts and slide back into the wasteful consumption of energy, then the full force of the energy crisis will be brought home to America in a most devastating fashion, and there will be no longer any question in anyone's mind about the reality of the crisis (Nixon, 1974).

It would be interesting to conduct another content analysis on all modern media in order to find if war frame frequency considering climate control has increased or decreased in recent years. An anecdotal example entitled *Does Our Military Know Something We Don't About Global Warming?* (Conca, 2014) seems to have a considerable following (315,175 views) especially considering the conservative source that is *Forbes*.

The fix frame was present relatively consistently throughout the entire time analyzed (see Table 2). It was on average the most frequently depicted frame when looking at all three cycles

(M= 1.7517) (see Table 1). Although under closer inspection (see Figure 2) a period from 2000 to 2006 marks a relative absence considering the fix frame. This correlates with a time when “social scientists challenged the key assumption underlying” the “public understanding of science model” (Nerlich, Koteyko, and Brown, 2010, p. 99). This could correlate with “climate change receding from the public debate” (p. 100) at a time when coverage focused more on values and risk compared with science. The fix frame experienced frequency fluctuations (reaching into the zero level) just before and after World War II and around 1975. Military spending decreased in the mid 1970’s (Walker, 2014) and this could help explain the lack of fix heavy reporting during the period. In other words climate control research is tied to military spending so less spending and research equals less news reports that describe it.

The people frame has increased in recent years. This correlates with communication strategy that says “there are no quick fixes” and holds “advocates, in turn, must focus more on people and less on carbon” (Luers, 2013, p. 18). Whereas prior visual research found people to be the most frequently depicted (O’Neil, 2013, p. 14) when looking at a larger longitudinal sample the impacts and fix frames are much more dominant. The recently increased people frame corresponds with the mass media’s obsession with individuals rather than collectives, or concepts. Communication researchers have said, “Individualism . . . remains the most prominent value underpinning daily journalism. . . . Individuals . . . are the main characters in many enterprising news stories, and certainly our culture’s interests in individual achievement and notoriety help nourish news media’s (and audience’s) obsessions with particular celebrities” (Campbell, Jensen, Gomery, Fabos, & Frechette, 2013, p. 152). The individualist versus collectivist viewpoint (Barnes, 2007; Triandis, Brislin, & Hui, 1988, p. 269) might be worthwhile to examine considering the people frame. Also since science emphasizes the process

of building on the shoulders of others focusing on individuals might be counterproductive considering science communication.²² Future articles describing the climate control people frame should be less episodic. In other words science media should be more focused on the scientific processes and ideas that go into the theories and results--instead of the personalities who happened to be there at the time. Also the origins of the theories and data results should be included in the framing of the message both visually and textually. The impacts frame could benefit from less episodic framing as well.

It is interesting that the impacts frame from 1851 to 1940 had the highest frame means per image of any frame during any cycle (M= 1.9245, SD= 1.86928). The impacts frame frequency then dropped significantly (M= 1.2, SD= 1.07841) during the next cycle lasting from 1941 to 2005. The reason this frame had significant differences between cycles probably has to do with natural weather events. For example during the Dust Bowl many climate specific images surfaced but during World War II other more human impacts such as war were probably more present within people's minds. This explanation could explain why only the impacts frame from cycle 1 to cycle 2 had a statistically significant difference. Furthermore the Dust Bowl also known as the Dirty Thirties produced some spectacular imagery which would be included in the impacts frame. Record setting heat was also recorded during this cycle. For example Baker, California reached 134 degrees Fahrenheit July 10, 1913. Also a greater percentage of the people were farmers in the first cycle so the public could have been more sensitive to weather impacts as well. An example of this coverage was found in *The New York Times* article by F.A.Silcox,

²² Furthermore, "sociologists of science today take it for granted that science is a collective activity in a profound sense, and it was above all Robert Merton who established this at a time when a misconceived individualistic perspective was generally used to address it" (Barnes, 2007, p. 179).

Chief Forester of the U.S. Department of Agriculture, which called for the creation of a “forest shelterbelt 100 miles wide and extending more than 1,000 miles across the Great Plains” (Silcox, 1934, p. XX3). The title said, “*To Insure Against Drought, A Vast Plan Takes Shape: The Program for a Belt of Trees Reaching From Canada to Texas Envisages Modification of the Climate of the Great Plains*” (p. XX3). Although this article has fix frame elements it also contained two images of dried out land, a frequent media frame of the time.

The results overall show a consistent frame frequency between cycles which is a testament to the perennial nature of climate control in the media through time. If we just looked at the average frequencies (see Table 2) per cycle one could conclude the coverage has been relatively even cycle to cycle and there is nothing new under the sun. For example warnings about our “vulnerability to climate change” (Sullivan, 1975, p. 92) from the National Academy of Sciences describing “climatic changes as a result of our own activities” (p. 92) surfaced in *The New York Times* in 1975. Although back then the headline read *Scientists Ask Why World Climate is Changing; A Major Cooling May Be Ahead* (p. 92). Since scientists observed a “drop in mean temperatures since 1950” (p. 92) some²³ extrapolated the trend in order to come up with their ice age predictions. The major human caused control lever that was thought capable of ushering in an ice age was increased aerosols in the atmosphere especially sulfur dioxide (Rasool & Schneider, 1971, p. 138). It is interesting the media gravitated more to the cooling framing instead of the warming framing during this time (Cook, 2015). This could explain the lack of coverage during the 1980s. Perhaps the media needed time so the public could forget its last prediction?

²³ More peer-reviewed papers predicted global warming compared with global cooling during the time period from 1965 to 1979 (Peterson, Connolley, & Fleck, 2008, p. 1325).

Although the weather may vary decade to decade its effects are felt every day by nearly everyone. This creates a natural regulating function built into weather news. Perhaps no other media topic gets as consistent and as high profile coverage as the weather or climate since no other topic gets a free steady supply of news fodder ready to literally saturate the market. The news audience has and always will feel the weather's impacts. Upon further investigation people have also tried to fix, control, and make war with the climate almost cyclically.

If we were just looking at the frequency tables we would have to conclude the Downs issue-attention cycle is not present when considering climate control in the media. Although two confounding factors arise the first one has to do with sample size. A larger sample or breaking time into smaller historical cycles could help reveal peaks and valleys covered up by such a coarse initial analysis. The second factor has to do with the graphing results of the frame frequency data. The graph results show a less consistent flow of climate control media coverage. This more fine-grained analysis reveals specific times of fluctuation followed by times of relatively steady coverage even within a single cycle. When we zoom in on media history we are tempted to correlate historical events with these trends of fluctuation and consistency. This is what was reported in the results section describing each of the Figures. During this discussion support for Downs issue-attention theory was found in three of the four frames. The most powerful graph in favor of Downs issue-attention theory tracks the frequency of all four frames combined as one signal (see Figure 5) through time. This graph clearly shows three peaks and three valleys or in other words three times Downs issue-attention cycle completed within the span of time measured. Actually it has only completed two times but the trend shows less coverage going into 2015.

Shortcomings and Further Research

Challenges that this researcher encountered included finding images from *The New York Times* as they appeared in print. Ironically newer images were more difficult to find since many paper collections are transferring into digital collections and some do not even include images. Confounding factors included not knowing whether reading an article on the Internet versus the paper version might produce a different reaction. Also early articles were in black and white while newer articles were in color. Furthermore the sample used in this study might have been too small. A census concerning this topic would help validity since the years contained in each cycle were not spread out evenly. For example the third cycle (because of the massive number of articles) does not have as much fine-grained analysis compared with the first and second cycles. Also in order to increase validity the images could have been operationalized with more basic elements. For example the coding did not include questions regarding images containing color versus black and white. Further analysis could break frame elements down further in order to compare manifest content between cycles including specific items like celebrities, scientists, and smokestacks. This could help clarify climate change in general since “there is no common conceptualization of what climate change means, and so a diversity of climate change imagery arises” (O’Neill, 2013, p. 18). Finally “newspapers have been extensively studied, [but] attempts to examine construction of climate mitigation issues in emergent social group, blogs, and other new media are still relatively rare” (Nerlich, Koteyko and Brown, 2010, p. 107) and in need of future study.

The present research also had issues with intercoder reliability which was on the low side. In order to improve agreement between coders the coding instrument could be refined. For example less frame elements per frame could make the coding instrument easier to use. Also the

content categories could be clarified with a more in-depth training session. Still the ambiguous nature of the topic makes some disagreement unavoidable. Attributing natural versus human caused weather events is a challenge for scientists. Categorizing visuals of these same events is just as difficult. One problem has to do with the static nature of images. For example if one does not have a reference point or a before and after image it is difficult to gauge change. For example Antarctic ice shown in 1975 (Sullivan, 1975, p. 92) was framed as an invader since it was and continues to expand (Ramsayer, 2015). Whereas the same type of ice images shown in 2015 were framed as retreating (Kenigsberg, 2015, p. C8). Also as “a former Environment Correspondent for BBC News observed: ‘Above all environmental stories really need good pictures...global warming is very difficult because you can’t actually see global warming’” (Anderson, 2009, p. 13).

Climate Control Communication Strategy

This visual framing content analysis can improve climate control communication strategy but the first step is to admit there is a problem with the current one. According to communication researchers climate change advocates have failed to convince the public that global warming is a salient problem and therefore “the US climate movement has failed to create the political support needed to pass significant climate policy” (Luers, 2013, p. 13). This trend of ineffective climate change communication messages has robust support from survey data. For example from April 2008 to October 2009 11% fewer Americans saw solid evidence that the Earth was warming due to human activities (Pew Research Center, 2009b). Furthermore in 2009 global warming was ranked at the bottom of a list of twenty policy priorities according to the public (Pew Research

Center, 2009a). Also, in 2007, 23% of Republicans viewed global warming as a top policy priority; this fell to 15% the following year and has flat lined to today (Pew Research Center, 2015). In defense of the present strategy, “today, the only long-term data to help track indicators of political will are surveys of public attitudes, which are all at a national scale and cover only broad issues” (Luers, 2013, p. 15). So either these surveys do not have enough resolution or things are very bad because “according to Gallup, there has apparently been little change in US public opinion on climate over the last two decades” (p. 15) despite the fact that “many millions of dollars have been poured into outreach and advocacy efforts” (p. 14). This public disengagement at best and hostility at worst towards climate change messages has translated into carbon agreements instead of binding carbon legislation. If one does not want this trend to continue a change in communication strategy is needed.

The current paradigm in climate change communication asks “policymakers, scientists, and communicators to look beyond simple transmission models or public understanding models of the relationship between expert knowledge and ‘lay knowledge’ (Nerlich, Koteyko, & Brown, 2010, p. 106). In other words to “focus more on values and less on science” (Luers, 2013, p. 16) has been the golden rule for communicators to follow. Although according to the data, “it is interesting to note that even among the heaviest Fox News viewers, about 50% or more endorsed the views of mainstream scientists. In no instance do we see a sizeable majority of Fox News viewers disagreeing with most mainstream scientists or expressing little trust in scientists” (Krosnick & MacInnis, 2010, p. 3&4). Also according to the present research which looked at *The New York Times* scientists and graphs (imbedded in the fix frame) were presented more frequently in past articles (cycle 1 & 2) compared with present articles (cycle 3). This correlates with survey results that showed global warming acceptance was higher during the past (when

even conservatives like Margret Thatcher²⁴ and George H. W. Bush supported climate change) compared with the present (Pew Research Center, 2015).

Also one must consider that carbon dioxide production in the developed countries is receding while in the developing countries it is enhancing exponentially. The real challenge for climate change communicators is convincing those on the edge of poverty to cut their electrical supply in the short term in order to control global temperatures in the long term. This will be exceedingly difficult since developing countries think developed countries should bear the brunt until they can benefit from the carbon bump as well. Although there are a few studies focusing on Brazil, Russia, India, and China (Anderson, 2009, p. 176) this is where the majority of the research should be focused in order to get the most effect if one believes one can control the climate via media messages. On the other side of the coin society must pay “attention to the nature of ‘manufactured risks’ [which are] potentially far more catastrophic and far-reaching than ‘natural hazards’” (Anderson, 2009, p. 167). This anthropogenic apocalypse could happen if just a few elite voices and interests are heard. Since “only if we involve those who are affected in our decision-making processes will we be able to protect ourselves from the consequences of climate change” (Beck, 2015, p. 76). It is interesting that “macroeconomic productivity of entire wealthy countries is reported not to respond to temperature” (Burke, Hsiang & Miguel, 2015, p. 235). While poorer countries in general respond with greater negative economic consequences as a result of temperature change (p. 235). All of these factors must be considered in future framings of climate change in the media.

²⁴ In September of 1998 Thatcher “made her famous ‘green’ speech to the Royal Society... following Mrs. Thatcher’s intervention, scientists lost definitional control of the debate as political actors increasingly sought to shape the agenda” (Anderson, 2009, p. 3). Thatcher’s conservative politics used climate change to her advantage regarding her “strongly unfavorable treatment of unions” specifically in the coal industry (Towers, 1989, p. 163).

Appendix A: Coding Instrument

Instrument # _____

Coded by: Jason (1) Sara (2)

Cycle (circle): 1=1851-1940 (1) 2=1941-2005 (2) 3=2006-Present (3)

Date:

Page:

Article Title(s):

Placement (circle):

Vertical Upper above fold (1) On the fold (2) Lower below fold (3)

Horizontal Left (4) Middle (5) Right (6)

Frame 1: Climate Control is War (War)

Are any of the following words or representations present in the image?	YES (1)	NO (0)
---	------------	-----------

1. Navy, Air Force, Department of Defense, Office of Naval Research, (for expanded list of overtly militaristic titles see codebook)		
2. Kill, deploy, operation, rationing, food shortage, famine.		
3. War, Fight, weapon, combat, battle, or propaganda.		
4. Catastrophe, doomsday, Dr. Strangelove, Cold War, atomic bomb, Star Wars, nuclear winter.		
5. Environmental warfare. Weather as a weapon.		
6. Military equipment		
7. Military Personnel		
8. Military symbols (Army, Navy, Marines, Department of Defense, emblems).		

Frame 2: Climate Control Fix (Fix)

Are any of the following words or representations present in the image?	YES (1)	NO (0)
9. Clock, thermostat, switches, dials, levers, sunshades, sunglasses or sun umbrellas, tools as symbols for geoengineering.		
10. Micro-climate & adaptation (travel, air conditioners, humidifiers, stoves, shelters, dams, clothing)		
11. Science graphs, charts, data		
12. Earth represented as digitalized for example image of earth juxtaposed with grid lines. Machines predicting weather.		
13. Green technology, geoengineering technology pictured (planes, computers, satellites, ships, earth moving equipment, carbon sequestering devices)		
14. Flood control, tide control, crop control, insurance.		

15. Man not understanding climate, baffled, uncertainty, perplexed, mystery.		
16. Tweak, turn down, adjust, tune up, tune.		
17. Fixing the sky, fixing the weather, fixing the climate, fix		
18. The earth is a patient or sick, fever. Hacking the climate, heat engine, climate is like a car engine.		
19. Rainmaking, fog dispersal, cloud control		
20. Indirect climate change, women's rights, population control, overpopulation, birth control, women's rights.		
21. Man (people) change, changing, altering, modifying, or controlling climate.		
22. Man (people) understanding climate.		

Frame 3: Climate Control Personalities (People)

Are any of the following representations or words present in the image?	YES (1)	NO (0)
23. Portraits, cartoons, or photographs that represent specific key figures in climate control politics. Also if their name is present in the image.		
24. Does image contain cartoons?		
25. Climate scientist pictured?		
26. People predicting weather/climate.		
27. Image of celebrity?		
28. Non-scientist, civilian, regular people?		
29. Climate scientists observing climate. Climate scientists traveling for research.		
30. Physicist or non-climate regular scientist.		
31. Images of God (Goddess) or Mother Nature.		
32. People controlling weather/climate.		

Frame 4: Climate Control Impacts (Impacts)

Are any of the following representations or words present in the image?	YES (1)	NO (0)
33. Civilians negatively affected by anthropogenic climate change; experiencing an emergency.		
34. Landscapes & objects negatively affected by climate change		
35. Animals negatively affected by climate change		
36. Polar bears		
37. Landscapes not changing (information on specific climate types depicted by static and consistent scenes).		
38. Civilians, climates, or ecosystems affected by climate control.		

39. Acidification		
40. People or landscapes affected by storm, hurricane, or tornado.		
41. Dry, desert, cracked earth, dead plants		
42. Ice, glaciers, icebergs, tundra		
43. Floods		
44. Civilians positively affected by climate change or climate.		

Appendix B: Code Book

Definitions of Themes and Visual Elements Described in *The New York Times* about Climate Control:

Research Summary

This research focuses on how climate control was visually portrayed in *The New York Times*. Framing methods and theories were borrowed from past climate change and climate control (geoengineering) communication studies. For example the four frames used were not invented but re-used in order to establish standards needed for replicability and in order to build upon past findings. The descriptions of common words were also repurposed for this study in order to establish more consistency in the field. This is the codebook for operationalizing the units of analysis into frame types. A “code” is “a device which informs and patterns all events that fall within the boundaries of its application” (Goffman, 1974, p. 8).

Unit of Analysis

The unit of analysis is each image found in the article. There is one instrument for each image. If an article does not have an image it was excluded from the sample. If a visual subject in the analysis needs clarification the coder may go into the main text for background purposes in order to say whether or not it fits the description.

Sampling

The images were selected for the sample via *ProQuest Historical Newspapers: The New York Times, 1851-2010 & 1980-present* databases. The advanced search function was used and each search had the specific dates representing the three cycles (1851-1940, 1941-2005, 2006-2014). The search words included “climate control”, “geoengineering”, “climatic change”, “weather control”, “climate change”, “climate warfare”, “rainmaking” and “climate modification”. If a cycle did not respond to a certain search word(s) the next search word(s) was used until 25 articles from each cycle were selected. The “relevance” function was selected in the advanced search menu and when one search stopped producing relevant articles the next was entered. Some articles were discounted if they did not reference the weather or climate. For example some articles focused on the banking “climate”, alumni “control”, or liquor “control” and were off topic. Other articles talked of controlling the climate of a room with stoves or air-conditioning devices and were included since this is examples of climate adaption. Articles mentioning birth control, population control, and genetic control were also included since they were framed as both having an effect on the climate or getting affected by the climate.

Coding Procedure

Coder 1 (Jason) will code all the images from the sample. Coder (2) Sara will code 20% of the images in order to establish intercoder reliability when it comes to discerning whether the frames are present in the image or not. This research only looks at manifest content not latent content.

Variable # & Frame Type (Climate Control is War “War”, Climate Control Fix “Fix”, Climate Control Personalities “People”, or Climate Control Impacts “Impacts”)	Theme, Idea, Word, or Representation Analyzed, Described, and Defined.	Examples
1. War	Military equipment	Ships, bombs, airplanes, satellites, trucks, tanks, radar or missile/radiation detection computer systems, items soldiers use while soldiering.
2. War	Military Personnel (Soldiers, technocrats, Geoclque members, Generals, or military advisors, soldier scientists) present.	Soldiers, technocrats, Geoclque members, Generals, or military advisors, soldier scientists. Military uniforms are an indicator but science soldiers can be identified by crew cuts and identified in text. They may be seen observing the weather, gathering samples or data, installing or repairing weather equipment. Signal Service which later turned into U.S. Weather Bureau originated in Secretary of War’s jurisdiction http://www.weather.gov/timeline . Climate modeling is sponsored by Office of Naval Research in the present time as well http://www.clivar.org/panels-and-working-groups/wgomd/events/high-resolution-ocean-climate-modeling-workshop
3. War	Military symbols (Army, Navy, Marines, Department of Defense, emblems.)	Military service seals: U.S. Army. (2015). Retrieved October 9, 2015 from http://www.army.mil/symbols/ U.S. Department of Defense. (2015). Retrieved October 9, 2015 from

		<p>http://www.defense.gov/Media/Military-Service-Seals http://www.defense.gov/multimedia/web_graphics/ Image from: http://commons.wikimedia.org/wiki/File:Seal_of_the_Office_of_Naval_Research_department_of_the_United_States_Navy_in_1959.png</p> <p>Image from: http://en.wikipedia.org/wiki/Information_Awareness_Office#/media/File:IAO-logo.png For more information on the geosciences role in the creation of the surveillance state see Turchetti and Roberts' book <i>The Surveillance Imperative: Geosciences During the Cold War and Beyond</i>. Turchetti was contacted during this research and he said he thought the militaristic or war framing of climate change was interesting and was writing a book on the topic as well.</p>
4. War	Overtly militaristic titles include: Navy, Air Force, Department of Defense, Office of Naval Research, Armed forces, RAND Corporation, JASON, MEDEA, American Geophysical Society, M.I.T. Massachusetts Institute of Technology, United Nations	The American Geophysical Society was created by the National Research Council who was created for specific military purposes during WWI (Turchetti & Roberts, 2014, p. 1). Since the rest of the names are overtly militaristic anytime one of the names listed comes up in an image in indicates this variable helps signify a war frame.
5. War	Kill, deploy, operation, rationing, food shortage, famine.	These ideas and words occur during or after times of war. They are the effects of war. Anytime a death occurs because of intentional violence a war frame is likely. The word kill or depictions of killings or deaths is the mechanism for triggering this frame element. Death might be depicted with a grave stone, contorted bodies lying on the ground, or numerical figures next signifying a death

		count. Deploy and operation are words to look for in the image although a group of soldiers exiting a piece of military equipment could signify being deployed. Rationing, food shortage, and famines are visually symbolized with images of empty grocery store shelves, skinny people, dried up crops.
6. War	War, Fight, weapon, combat, battle, or propaganda.	These ideas and words occur during the war. Fighting the climate looks different than fighting a human enemy. It is difficult to attribute visual actions to fighting the climate since virtually all actions like a butterfly flapping its wings have some effect on the climate battlefield. Therefore unless some cartoonish depiction expressly shows a human battling Old Man Winter, Mother Nature, Zeus or some other symbolized depiction of nature or climate (while using old fashioned battle techniques like hitting or shooting) the words are what signifies this war frame element. For example see Fleming’s 2008 book cover.
7. War	Catastrophe, doomsday, Dr. Strangelove, Cold War, atomic bomb, Star Wars, nuclear winter.	If any of these words were written or visually depicted in the image this war frame element gets selected as being present. In order to get an idea of how the Rand Corporation was framed in the mainstream media see “Bland” inspired reference in <i>Dr. Strangelove or: How I Learned to Stop Worrying and Love the Bomb</i> (Kubrick, 1964). This reference demonstrates how catastrophic influences permeated visuals including movie themes. Communication researchers found the Dr. Strangelove metaphor being used 3 times in order to relate “a negative attitude to geoengineering” (Luokkanen, 2013, p. 7&12). Whether the nuclear winter scenario could happen or not was hotly debated during Carl Sagan’s era. This debate regarding anthropogenic effects primed the scene for the greenhouse effect debate. Atomic bombs were used during whether modification tests e.g. Operation Argus. Another connection is clouds symbolized as bombs.
8. War	Environmental warfare. Weather as a weapon.	If these words or representations are present in the image it signifies this war frame element is also present. An early example includes Zeus

		with a thunder bolt a later example includes the technocrat grasping levers connected to the seasons as depicted on the front page of <i>Colliers</i> magazine on May 28, 1954.
9. Fix	Clock, thermostat, switches, dials, levers, sunshades, sunglasses or sun umbrellas, tools or objects as symbols for geoengineering.	These images are metaphors that represent a more complex subject. For example an image of the Earth personified and with a thermometer in its mouth symbolizes the greenhouse effect which is a form of geoengineering. A picture of a fan spinning and cooling the earth down represents geoengineering as well.
10. Fix	Micro-climate & adaptation (travel, air conditioners, humidifiers, stoves, shelters, dams, clothing, fans, ice)	Micro-climate & adaptation include controlling the climate that is immediately surrounding the person. Travel by horse, car, train, or boat helps one control the climate nomadically.
11. Fix	Science graphs, charts, data	Line graphs with an x and y axis is the classic example. Although pie charts, spreadsheets, and other methods to visually display information is included in this frame element.
12. Fix	Earth represented as digitalized for example image of earth juxtaposed with grid lines. Machines predicting weather.	The computers used in climate models break the earth down into small grids. This process is visually portrayed when the image of the earth is shown with a grid pattern transposed over the top of it.
13. Fix	Green technology, geoengineering technology pictured (planes, computers, satellites, ships, earth moving equipment, carbon sequestering devices, and carbon emitting devices.	This fix frame element includes images of windmills, biofuel production facilities, solar panels, grid systems, algae bioreactors, fuel cells, geothermal reactors, nuclear reactors, tidal mills, and electric cars, geoengineering equipment for enhanced weathering, smoke stacks, exhaust pipes, stratospheric aerosol injection, U.K. SPICE blimps, and nanotechnology atmospheric particles. The tools in this category are manifest and actual. Whereas tools in the clock, thermostat, and switches category (#9) are metaphors for a more complex subject that they crudely represent or signify.
14. Fix	Flood control, tide control, crop control, insurance.	A way to fix the climate is to set up human systems like insurance that can mitigate the damages for example from a hail storm on a crop of corn. Dams are a way to control the

		ebbs and flows of rivers and the carbon free energy mitigates the greenhouse effect.
15. Fix	Man not understanding climate, baffled, uncertainty, perplexed, mystery.	Climate uncertainty— this variable is present anytime the words man not understanding climate, baffled, uncertainty, perplexed, or mystery are present in the image. This element is visually portrayed with a person scratching their head or an image of a question mark that appears floating above someone or something.
16. Fix	Tweak, turn down, adjust, tune up, tune.	Climate tweak— this element is present when an image of the words tweak, turn down, adjust, tune up or tune are present within the image. Also this element is visually portrayed when an image of a knob or some other physical control function like a button or computer screen is connected to the Earth’s climate system. Words like hacking the climate and heat engine also trip this element if they are visually manifest in the image. Furthermore if the climate is likened to a car engine with words or images of a car’s hood open that is included as well.
17. Fix	Fixing the sky, fixing the weather, fixing the climate, fix	Climate fix— this element is present when the words “fix”, “fixing the sky”, “fixing the weather”, “fixing the climate” or “fix” is present somewhere in the image. This can be visually portrayed with an image of a carpenter or mechanic with tools who is working on a visual representation of the Earth as they would be doing as a normal day’s work.
18. Fix	The earth is a patient or sick, fever. Hacking the climate, heat engine, climate is like a car engine.	Earth sickness— if the image of the Earth is portrayed with thermometer coming from its mouth that includes this frame element. The Earth laying in a bed or being attended to by a doctor or nurse also trips this element. Doctors and nurses are visually represented with a red cross symbol on their clothes, white clothing, a reflector on their head, or the image of a needle or syringe.
19. Fix	Rainmaking, fog dispersal, cloud control	Weather control— if the words rainmaking, fog dispersal, weather control, or cloud control are present in the image this frame element is present in the image.
20. Fix	Indirect climate change, women’s rights, population	Indirect climate control— if women’s rights programs associated with the United Nations are visually present in the image this element

	control, overpopulation, birth control, women's rights.	is present. Words like population control, overpopulation, and birth control signify this frame element.
21. Fix	Man (people) change, changing, altering, modifying, or controlling climate.	Man controlling climate—if a person or entity is visually depicted as somehow changing or altering the climate (on a micro or macro level) it fits this category. Examples of a micro level change include someone holding an umbrella (see variable 10). If this umbrella happens to be shaped like a volcano (which is supposed to signify stratospheric aerosol injection i.e. chemtrails) and its particles are blocking the sun's rays this signifies change on a macro level and also symbols of geoengineering (see variable 9).
22. Fix	Man (people) understanding climate.	Man understanding climate— if the words “man understanding climate” are in the image it signifies this frame element is present.
23. People	Portraits, cartoons, or photographs that represent specific key figures in climate control politics. Also if their name is present in the image. Portraits cartoon or photographs that represent key figures in climate control politics including:	Although everyone has some role in climate change politics this category includes politicians or elected officials of country's governments. They include but are not limited to Al Gore, Rajendra K. Pachauri, Gro Harlem Brundtland, Ban Ki-Moon, George Bush, George Bush, Vannevar Bush, Barack Obama, Wen Jiabao, John Kerry, Hillary Clinton, Sergio Serra, Jake Schmidt, Yvo de Boer, Robert Orr, Michael Levi, Angela Merkel, Jacob Zuma, Luiz Inacio Lula da Silva, Manmohan Singh, Denis McDonough, Robert Gibbs
24. People	Does image contain cartoons?	Cartoons are drawings or animations that differ from photographic derived images. The question asks does the image contain cartoons versus whether it is a cartoon since some images contain both and this way it resolves the issue while noting the present of animations in the visual framing of climate control.
25. People	Climate scientist pictured? A climate scientist is considered someone who has published a peer	Ken Caldeira, Bala Govindasamy, Edward Teller, Lowell Wood, David Keith, Michael MacCracken, Nicola Jones, Carroll S. Wilson, Ken Caldeira, Bala Govindasamy, Edward Teller, Lowell Wood, David Keith, Michael

	<p>reviewed paper regarding climate in a geophysical journal. They are almost always connected with a university, support the greenhouse effect theory and have high confidence in computer generated climate models.</p>	<p>MacCracken, Nicola Jones, James E. Lovelock, Howard J. Herzog, J Roger P. Angel, Martin I. Hoffert, John Lantham, Nadine Unger</p>
26. People	<p>People predicting weather/climate.</p>	<p>This category is visually depicted with witchcraft, wizardry, and crystal balls. Famous people in history who have predicted disasters may also be invoked.</p>
27. People	<p>Image of celebrity?</p>	<p>This category includes those who would be considered movie stars, television stars, or musicians. Artists can also be in this category. Any person who has a large following and is recognized by strangers on the street. Leonardo DiCaprio, Brad Pitt, and TKTKTKT.</p>
28. People	<p>Non-scientist, civilian, regular people.</p>	<p>Just because this category includes regular people doesn't make them un-powerful. For example people in this category direct large non-government organizations. In the future it would be good to split this category into herd civilians and super effective civilians. Robert M. Metcalfe, Carl Pope, Angela Anderson, Gus Silva-Chavez,</p>
29. People	<p>Climate scientists observing climate. Climate scientists traveling for research.</p>	<p>Climate civilian—images of people other than climate scientists, celebrities or politicians fit this category. 7) Climate scientists traveling—this frame element is identical to frame element 25 except this category show action. For example climate scientists with suitcases or riding in a plane would trigger this category.</p>
30. People	<p>Physicist or non-climate regular scientist.</p>	<p>Physicist or scientist—this category visually depicts non-climate scientists who also practice science. This category is signified by the words “physicist” or “scientist”. A person with wild hair, white lab coat, and beakers with liquid visually depict a scientist.</p>
31. People	<p>Images of God (Goddess) or Mother Nature.</p>	<p>The God frame—this category visually depicts images of God, Mother Nature, Old Man Winter, Zeus, Poseidon, various rain gods or</p>

		Thor. This frame is triggered by the words “God”, “god”, or the names of the deities just mentioned. God is sometimes depicted as wearing flowing white robes, sitting on a cloud, and having a long white beard.
32. People	People controlling weather/climate.	People Controlling Climate —this category is same as frame element 21 although it is focused on the people versus the control.
33. Impacts	Civilians negatively affected by anthropogenic climate change; experiencing an emergency.	Climate emergency—was present when people were shown in precarious situations. For example a person holding on to a branch while running water is trying to carry them away is included in this element. People having looks of distress on their face is also included. Looks of distress included frowns, crying, or screams associated with an open mouth. Another way emergency is portrayed is with emergency equipment and personal on the scene. The scene is usually depicted as being in disorder for example heavy flooding, debris, or upside down cars and houses. Melting ice which is images of ice and water next to each other is also considered an emergency.
34. Impacts	Landscapes & objects negatively affected by climate change	Landscapes and objects negatively affected—this frame element is consistent with frame element 33 except there is no people present. Before and after images showing differences is included in this image.
35. Impacts	Animals negatively affected by climate change	Animal emergency—this frame element is the same as element 33 except instead of people in trouble animals are in unusually circumstances. For example a polar bear might be sitting on a small chunk of ice or scenes with dying animals or fish.
36. Impacts	Polar bears	Polar bears—if a polar bear is present this frame element is present. A polar bear is white.
37. Impacts	Landscapes not changing (information on specific climate types depicted by static and consistent scenes).	Landscapes not changing—since all images are stable this frame element is portrayed with before and after pictures where both images are nearly identical.
38. Impacts	Civilians, climates, or ecosystems affected by climate control.	Civilians, climates or ecosystems affected by climate control—this frame element is present when people or landscapes are juxtaposed next

		to carbon emitting or carbon sequestering devices.
39. Impacts	Acidification	Ocean acidification—this frame element is present when a PH level is next to a sea depicting an ocean. This frame may also be present with a beaker that says “acid”. Also if the words “ocean acidification” are present in the image.
40. Impacts	People or landscapes affected by storm, hurricane, or tornado.	Storms—when people or landscapes are affected by storms this element is triggered. Trees or people bent over signifies high winds. So does articles suspended in air or funnel clouds. High water, rain, and snow also signify this storm element.
41. Impacts	Dry, desert, cracked earth, dead plants	Desert landscapes—this element is present if dry cracked earth is present. Also images of sand piles, dead plants, or expanding deserts with before and after pictures make up this frame element.
42. Impacts	Ice, glaciers, icebergs, tundra	Ice—if ice, glaciers, icebergs, or tundra is present this variable is present. Also if any of these words are present within the image it should be marked.
43. Impacts	Floods	Floods—if running water is pictured where it usually doesn’t run this frame element is present. For example if water is running across a road or through a building this includes the floods frame element.
44. Impacts	Civilians positively affected by climate change or climate.	Civilian positively affected by climate control—this frame element is present when smiling faces are next to carbon dioxide emitting or carbon dioxide sequestering devices. Together each of the frame elements mentioned contribute to signify whether a frame is present or absent.

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