

IT'S A CONSPIRACY: MOTIVATED REASONING AND CONSPIRACY IDEATION IN
THE REJECTION OF CLIMATE CHANGE

by

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B.A. University of Central Florida 2013

A thesis submitted in partial fulfillment of the requirements
for the degree of Master of Arts
in the Department of Sociology
in the College of Sciences
at the University of Central Florida
Orlando, Florida

Summer Term
2015

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ABSTRACT

A large disconnect exists between the general public's acceptance of human-caused climate change and the prevailing consensus of actively publishing scientists. Previous research has examined both political and economic motivated reasoning, media influence in print and television, conspiracy ideation as a predictor of science rejection, and the role of the social construction of scientific knowledge in science rejection. Using these previously studied justifications for climate change rejection as a starting point, this research examines 212 written responses to a prompt at Climate Etc. asking the community to explain their acceptance / rejection of climate change. Using a textual content analysis, this study finds that media choice, motivated reasoning, conspiracy ideation, and the scientific construction of knowledge all play important roles in explanations for climate science rejection. Work and educational background, as well as a reframing of the scientific consensus as a "religion," add new analytical perspectives to the motivated reasoning explanations offered in prior research. This analysis also finds that the explanations for climate science denial given by respondents are often complex, falling into two or more of the explanation types suggesting that science rejection may be a more complex social process than previously thought.

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CHAPTER ONE: INTRODUCTION

A scientific consensus exists within the field of climate science, backing the scientific theory that the planet is currently warming and that the warming is mainly caused by anthropogenic (“human-made”) sources (Anderegg et al. 2010; Cook et al. 2013; Doran and Zimmerman 2009; IPCC 2013; Oreskes 2004). This consensus, however, is not shared in the general American population with only 48% of Americans stating that humans are responsible (Pew Research 2013; Yale 2014). International and domestic television and print media sources have been analyzed thoroughly by researchers across disciplines through various methods and techniques, and have been found to play a large role in climate change opinion formation of the general public (Boykoff 2007; Boykoff 2008; Carvalho 2005; Dispensa and Brulle 2003; Lahsen 2005; Mazur 1998; McManus 2000; Taylor and Nathan 2002). Rejection of the scientific consensus on climate change has also been found to be based in cultural, political, and economic ideologies related to motivated reasoning, defined as the emotionally biased set of cognitive processes to evaluate and construct beliefs (Heath and Gifford 2006; Kunda 1990; Lewandowsky et al. 2013a; Lewandowsky et al. 2013b).

Even among those who accept the Earth is warming, surveys reveal that although 63-67% of Americans believe in global warming, 52-56% do not agree this is caused by human actions (Pew 2013; Yale 2014). With such a discrepancy, the question arises as to why there exists such a large difference between the views of the scientists and the general public, and what reasons people put forth for their Rejection of the scientific consensus on climate change. Drawing from these previously studied factors related to climate science denial, this research, through a textual

content analysis, aims to further investigate possible explanations for the disconnect between the publishing scientists' position on human-made global warming and the general public's. Such research is particularly important as prior research on the rejection of climate science, often based in survey research, suggests a binary division between those who “reject” or “accept” climate change (e.g. Brulle et al. 2012; Gavin and Marshall 2011; Lewandowsky 2013a), while recent qualitative studies focus on the discursive aspects of the online climate debate and the positions people take within the debate (e.g. Kirilenko and Stepchenkova 2014; Koteyko et al. 2013), leaving a dearth of information on how individuals situate themselves in this climate change debate and stated justifications for rejection of climate science.

CHAPTER TWO: LITERATURE REVIEW

The following literature review will review exemplary studies contributing to the scientific consensus on climate change, previously examined forces that have been shown to be responsible for explaining the disconnect between the scientific consensus and the general public, and how the general public is categorized in the climate change debate by prior research. Previous research has examined both political and economic motivated reasoning, media influence in print and television, conspiracy ideation as a predictor of science rejection, and the role of the social construction of scientific knowledge in science rejection. This study builds on this prior research to (a) further examine motivated reasoning beyond political and economic ideology, (b) to better understand the influence of online media sources, and (c) explore how conspiracy ideation and the social construction of knowledge are actualized in the rejection of climate change through text-based communications.

Climate Change

For the purposes of this study, the term climate change is defined according the United Nations Framework Convention on Climate Change (UNFCCC) definition. The UNFCCC defines climate change as "a change in 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 2013). Climate change in this sense represents any climate related phenomenon that can be at least partially explained by human-made increases in mean global temperature over the natural variance.

Scientific Consensus and Public Opinion

According to Pew Research in October of 2013, 67% of Americans believed there was "solid evidence" that the Earth was warming. However, only 44% believed humans were responsible (Pew 2013). In 2014, the Yale Project on Climate Change Communication found similar numbers with 63% of Americans believing that global warming is happening, but only 48% agreeing that it is mostly caused by humans. In contrast, scientific discourse in the published, peer-reviewed literature in the field of climate science paints a different picture, with 97% of actively publishing scientists in agreement that the planet is warming and that humans are responsible (Anderegg et al. 2010; Cook et al. 2013).

In regards to both scientific findings and the informed opinions of scientific researchers, three studies particularly exemplify the scientific consensus. First, in 2004, science historian Naomi Oreskes analyzed 928 abstracts published between 1993 and 2003 in refereed journals that included the keyword "climate change". Oreskes (2004) found that 75% of those papers implicitly or explicitly endorse the consensus view that humans are the cause of the current increase in global temperature. The remaining 25% dealt with paleoclimate science or methodology relating to climate change and did not take any positions on human-made warming, otherwise known as anthropogenic global warming (AGW). Out of the 928 papers, none disagreed with AGW.

In 2010, a team of researchers analyzed the most prominent and active publishing climate scientists. Looking only at those scientists who have authored or co-authored more than 20

published, peer-reviewed papers on climate change, they found 97%-98% of scientists support the basic principles of anthropogenic climate change (Anderegg et al 2010). Furthermore, they found those publishing scientists that doubted the consensus position had published less often and were cited less than the consensus supporting scientists.

The most recent study to examine the scientific consensus was in 2013. The study examined 11,944 abstracts between 1991 and 2011 found using a keyword search for "global climate change" and "global warming". The study found 33.6% of the abstracts took a position on global warming. Of those 33.6%, 97.1% explicitly or implicitly endorsed the positions that humans were responsible for the observed warming while only 0.7% rejected AGW and 0.3% were uncertain. The authors also invited researchers to rate their own papers. From the responses by publishing researchers 64.5% took a position on global warming with 97.2% of those authors endorsing human caused warming (Cook et al. 2013).

While the prior studies revealed empirical consensus, Doran and Zimmerman directly surveyed publishing climate scientists in 2009 to determine whether a consensus position existed. The survey asked two primary questions that were the focus of the study: "1. When compared with pre-1800's levels, do you think that global mean temperatures have generally risen, fallen, or remained relatively constant?" and "2. Do you think that human activity is a significant contributing factor in changing global mean temperatures?" (Doran and Zimmerman 2009: 21). Results showed of actively publishing researchers in the field of climate, defined as scientists who self reported as specializing in climate and have published over 50% of their work

in the field of climate science, 96.2% answered "risen" to question 1 and 97.2% answered "yes" to question 2.

The studies that have been done on this topic show a clear consensus in the scientific discourse of climate change, with the newer studies showing an increase in the number of climate scientists supporting AGW in recent years (Cook et al. 2013). The expert consensus and public opinion, therefore, appear as in direct conflict with one another. Prior research offering insight into explanations as to how the public forms opinions on climate change suggest the importance of media influence and political ideologies, as also related to motivated reasoning. The following sections will therefore review the most relevant quantitative and qualitative research on these topics, as related to the current study's focus on the disconnect between the scientific consensus and the general public.

Media and Social Influence

Prior research has shown that public opinion on climate change is greatly affected by how the issue is framed in the media (Brulle et al. 2012; Portinga et al. 2011; Whitmarsh 2011). The news media, by way of false equivalency or "balance as bias" coverage, often gives an equal or prominent position to what prior research has labeled as climate change 'skeptics', or those who question the validity of climate change, despite the scientific evidence to the contrary (Boykoff and Boykoff 2004). This is relevant to what has colloquially been defined as climate change denial or skepticism (see Dunlap and McCright 2011 for further discussion of terms), as rejection of climate change has been shown to increase after exposure to media that calls the scientific

findings into question, as based in research on how media coverage influenced public opinion on climate change.

Much research suggests the importance of media messages due to the increasing prevalence of a climate change debate, across mainstream news outlets and online media (Ford and King 2015; Moser 2010; Olteanu et al. 2015). Looking at messages put out by conservative media more specifically, Elsasser and Dunlap (2012) analyzed the climate change and global warming messages of conservative columnists at Townhall.com. They found that through the course of 4 years, from 2007 to 2010, 203 articles were published by 80 different conservative columnists. Of those 203, all of them were critical of climate change or climate science. Furthermore, the critiques used by the columnists were found to be common anti-global warming myths that have been previously addressed or debunked by the scientific literature. Elsasser and Dunlap (2012) note that this shows a near-hegemonic orientation of political ideology and climate change rejection among online conservative columnists.

Such near-hegemonic orientation may be critical to individuals' situating themselves in the public debate because research offering potential connections between media and climate change rejection suggests that exposure to anti-science messages regarding climate change has been found to directly influence opinion formation on climate change. For instance, an analysis of the British television and internet coverage regarding climate change and the Copenhagen negotiations by Gavin and Marshall (2011) was found to give undue attention to contrarian claims regarding climate science and representing these claims with an unjustified authority, meaning they gave undue weight to claims not supported by the scientific evidence. Surveys of

British citizens taken before and after the Copenhagen conference found a significant decrease in the number of people who believed climate change was happening and that it was human-made, citing they heard there existed "weakness" and "flaws" in the science behind climate change (Gavin and Marshall 2011). A meta-analysis of 74 United States public opinion polls between 1999 and 2010 found similar results. The researchers examined five factors they determined to be the most influential in changing public opinion on climate change: exposure to extreme weather, public access to scientific information, media coverage, elite cues, and movement/counter movement advocacy. They discovered media coverage, cues from the political elite, and movement/counter movement advocacy were the largest predictors of change in any change in public opinion, with the media coverage being the single most important factor of these three factors (Brulle et al. 2012). Overall, research suggests that media consumption plays an important role in the formation of public opinion of climate change related topics.

To further illustrate the importance of media, an analysis of 1,853, 392 twitter comments on climate change over the course of 2012 was done to determine the importance of media source in the online climate debate (Kirilenko and Stepchenkova 2014). Of the 34% of tweets that mentioned or linked to a media source, 50% of the tweets directed towards only 129 media sources. The most commonly mentioned media sources were mainstream press like the *New York Times* and *The Guardian*; however, tweets that were classified as "climate skeptical", or questioning of the validity of human-made global warming, mainly cited two major "climate skeptical" blogs as media sources, *Watts Up With That?* and *Climate Audit*. These results reinforce the importance of media influence on public opinion as it suggests that individuals are

both influenced by media sources and seek media sources to reaffirm their positions. While prior research on textual responses, and Twitter in particular, have remained focused on how Twitter users respond to extreme weather changes and related mediating effects of media messages (e.g. Kirilenko et al. 2015; Molodtsova et a. 2013), such findings suggest the importance of online communications as “sensors” of the climate change debate.

In addition to media influence, individuals’ social values and beliefs have been found to influence their perspectives on climate change. While certain research does not specifically utilize the term motivated reasoning, certain prior findings suggest the importance of biased cognitive processes on positioning in the climate change debate. Motivated reasoning is the set of biased cognitive processes used to construct, assess, and evaluate beliefs (Kunda 1990). In particular, the individual’s political ideology has been found to affect their stance on climate change. For instance, social psychologist Stephan Lewandowsky directly surveyed climate bloggers to determine what factors would predict a general acceptance or denial of climate science. The factors predicting a general denial of climate science included strict adherence to free market and laissez-fair ideologies, political conservatism, and belief in conspiracy theories (Lewandowsky 2013a). This confirmed the results found a year before that analyzed public trust in science from 1974-2010, which showed political conservatives were least likely to trust knowledge generated by scientists with trust in science showing a decreasing trend over the time period (Gauchet 2012). Furthermore, the results also validated previous work by Heath and Gifford (2006) which showed that rejection of climate science is related to free market ideological adherence. Additional research supports connections between political ideologies and

stated climate change stance; an examination of comments posted in response to CNN articles examined the online discussion of climate change in terms of the debate and policy implications (Nigel and Rice 2014). The study looked at 1702 blog comments and analyzed their content to determine what factors were associated in the climate change debate regarding policy implementation. Nigel and Rice (2014) found that political ideology was the main influencing factor when debating policy online with very few deviations from party line policy talking points. Democrats were aligned with environmental reform and Republicans aligned with status quo free market ideas. A secondary mediating factor of environmentalism and economics was also found to play an important role. The debate over policy was intertwined with commenters attempting to find a balance between preserving the environment and reducing economic impacts to humans, regardless of political affiliation. In these findings, therefore, political ideology played an important role in individuals' stated stances; however, the policy debate also suggests that further nuance in how ideologies are incorporated into individuals' positioning in the climate change debate.

Additionally, individual rejection of mitigation policy, the potential solutions, and programs to combat the effects of climate change has also been found to have a basis in what can be understood as motivated reasoning. A study in which focus groups were questioned about the ability to change their lifestyle to combat global warming, researcher found that respondents used social psychological defense mechanisms to justify inaction on climate change related issues that would impact their lives (Stoll-Kleeman et al. 2001). Respondents used ideas about the costs of mitigation as being too high, refocused blame on others, put the impetus of action

onto the government, and questioned the uncertainty of climate change and whether mitigation was even needed currently. Beyond rejection, defenses of ideologies play an important part of creating skepticism about policy even amongst those who are not skeptical of climate change per se. Another factor that seems to be critical in fostering rejection of mitigation policy as well as climate skepticism has also been found to lie in a position of temporal disassociation. Any perceived risks that may happen are seen to not be currently happening or are too far away to take immediate action. Researchers aimed to examine basic understandings of climate change through the use of focus groups which aimed to better understand how individuals view the changes in weather and climate as relating to the larger scale climate changes occurring worldwide (Hanson-Easey et al. 2015). Through these focus groups interviews, two major temporal themes emerged, the first is that any impacts of climate change are not as important as immediate impacts regarding individual economic concerns, and secondly, that any real impacts of climate change are going to happen in the future, so there is plenty of time to react. These temporal rejections are not necessarily rejections of climate change, but do certainly question the scientific understanding of the current effects of climate change and global warming. These findings offer suggestions for forms of motivated reasoning that may additionally be found in textual communications of positioning, particularly in relation to positions that can fall under the umbrella of climate change rejection.

A 2012 study of online reader comments from the online portal of the newspaper, *The Daily Mail*, focused on examining the importance of one particular climate change conspiracy, "Climategate" (Koteyko et al. 2013). Climategate was the release of selected hacked e-mails

from the University of East Angila's Climatic Research Unit which, according to climate skeptical blogs, showed wrong doing and collusion amongst scientists to manipulate data and thwart Freedom Of Information requests. Subsequent investigations by 8 separate governmental and institutional committees found no wrong doing on the part of the researchers or the university, however, Climategate remains a mainstay conspiracy within the skeptical community. The analysis examined comments on climate change from before and after the release of the hacked e-mails and found that Climategate seemed to assure and reinforce previously held beliefs about climate change skepticism, and through analysis of the discourse and rhetorical strategies used, may have allowed online commenters to voice opposition with increased confidence in their positions. Climategate had a significant decrease in public trust of scientists, however, this effect was mediated by political ideology, with political conservatives showing the largest decrease in trust, and did not change the perception that scientists were the best source of knowledge on climate change (Leiserowitz et al. 2013). Accordingly, the current study will draw from the conceptualization of motivated reasoning to better understand if and how individuals' reasonings can influence their constructed perspectives on climate change.

In the broader context of science rejection, Bruno Latour's constructivist approach to knowledge creation in the sciences provides another insight into science denial. Latour argues through Actor Network Theory (ANT) that scientific facts are socially constructed, and through interactions between actors, the scientific facts come to give meaning to a reality (Latour and Woolgar 1979: 180). In applying this to climate change and global warming, facts are constructed through the interactions of scientists and data to create and provide meaning to a

global view of climate (Latour 2011). It is this very same process of social construction that is then used as an argument to why climate change and global warming are not real or truth as they are merely constructions of scientists and products of poor data (Latour 2004). These arguments manifest themselves in the premise of uncertainty in science. This position is often actualized through arguments that question the validity of the information, scientific behavior, and methods used to construct knowledge.

Four main factors have been shown to be associated with climate change rejection to varying degrees: Media has been shown to both influence public opinion, and be sought out to confirm previously held beliefs; belief in any conspiracy, science related or not, has been shown to be a predictor of science rejection, economic and political ideologies that emerge as motivated reasonings to justify denial, and questioning the very way knowledge is constructed in the field and the uncertainty that exists.

Classification of Position on Climate Change

Studies that examine the online climate change debate often utilize surveys to measure position on climate change. The nature of these surveys leads to a binary position of acceptance /rejection of climate change, through analysis of responses to statements about climate change (Lewandowsky et al. 2013a; Lewandowsky et al. 2013b; Pew Research 2013; Yale 2014) that may not accurately portray the nuance in respondent positioning. Qualitative work to better understand the public's positioning has both followed the binary position found in the quantitative work, and has attempted to classify respondents into predetermined classifications or broad

analytic categories based on discourse. This section will highlight some of these qualitative studies to show there exists a gap within how climate change rejection is classified.

A classification strategy of using predetermined worldviews was done via an examination of 2,148 online reader comments posted in response to 128 articles on climate change focused on grouping the responses into two predetermined typology sets, the IPCC's AB-typology, in which the respondents are grouped by economic, environmental, social, and governmental concerns, and Cultural Theory's HEIF-typology which groups respondents by hierarchist, egalitarian, individualist, and fatalist (De Kraker et al. 2014). These predetermined worldview positions proved to be problematic as the commenter's positions did not fit into these determinations nicely and often fell across multiple categorical classifications. .

Another approach in an examination of microblog posts on Twitter, used a keyword search to create "frames" or attitudes towards climate change. These frames created a similar binary to quantitative surveys, focusing on ideas of "real" and "fact" and the converse of "hoax, lie, or fraud". (Mo Jang and Hart 2015) . In similar fashion, a separate Twitter comment analysis on the IPCC's Working Group 1 report on climate change categorized responses into "Unsupportive", "Supportive", and "Neutral" in regards to their views towards the IPCC's report (Pearce et al. 2014). These approaches, like the quantitative surveys, only serve to fit respondents into two possible positions on climate change which fails to account for complexities in how the public justifies their rejection.

Hobson and Niemeyer (2012) employed a mixed method approach to the classification of climate change skeptics. They found that through interviews, respondents were unlikely to classify themselves into any meaningful categories either explicitly or implicitly. Instead Hobson and Niemeyer used responses to questions about climate change to categorize respondents by similar discourses exhibited in their answers. They created 5 categories of climate skeptics, "Emphatic Negation" in which doubt is about whether the climate is changing at all, "Unpeturbed Prgmatism" in which doubt is associated with impacts of climate change, "Proactive Uncertainty" in which doubt is more generalized across multiple categories, "Earnest Acclimatisation" in which climate change is believed to be natural and not human-made, and "Noncommittal Consent" in which respondents have some epistemic uncertainty regarding climate science. While this approach begins to account for differences in rejection of science, the categories overlap and do not provide a true distinction in position, as "Proactive Uncertainty" acts as a catch all of discourses that overlap into other categories.

These differing approaches to classifying the public's position on climate change leave a fundamental gap in the field of research. Classifications have either focused on simple accept/reject binaries, fitting respondents into predetermined categories, or creation of categories through indirect methods that examine position from the view of the researcher instead of the view of the respondent.

Using these previous studies as a framework, the proposed research aims to continue the exploration into the discrepancy between the scientific consensus and public opinion. This study will examine computer-mediated communication through a textual content analysis in order to

better understand how people position themselves in the climate change debate, and their reasons for the rejection of climate change and climate science. This qualitative approach is intended to fill in the gaps in understanding climate science denial through a different methodological approach with a focus on how individuals view their own positions in the climate change debate, and how those positions compare and contrast to each other.

CHAPTER THREE: DATA AND METHODS

To create a sample for the textual content analysis, data consisting of blog comments, hereby defined as computer-mediated communications (CMC) were collected from the blog *Denizens II on Climate Etc*, the blog of prominent climate scientist Dr. Judith Curry. Prior research has used CMC to study language and language use in online communications ranging from e-mail, social network comments, and online blog and news article comments; additionally, social scientific work has addressed how CMC, and more specifically blogs, can be added to the “qualitative researcher’s toolkit” (Hookaway 2008: 91). Therefore, CMC can be argued to be a justified framework for analyzing standalone comments given in response to a blog post (Herring 2004). In a post dated February 15, 2015, Dr. Curry asked members of her climate change discussion community to respond to a writing prompt on why they rejected or accepted climate change. This discussion community is free to join and participate in; to participate, one needs to create a screen name and password. The blog appears to have consistent activity based on number of posts and is one of the 10 most central climate skeptic blogs on the internet (Sharman 2014). Dr. Curry included the following prompt: "Relevant topics to include in your post are your background, how you became interested in climate science, why you are skeptical or convinced about AGW, what other blogs you read. If you have a blog or a professional web site, please provide a link. It's up to you what you want to post...keep your posts to 500 words" (Curry 2015).

Due to the public accessibility and use of a textual content analysis, IRB approval for the use of human subjects was not necessary to obtain. A total of 265 responses were posted to this

prompt as of March 10, 2015. All responses were copied and saved as Word Documents. Through a manual review, 45 responses were determined to be reply comments and not original responses and 8 were found to be links to another website; these were removed from the initial responses due to a lack of information relevant to the topic of research. This led to the final sample size of 212 responses. For the purposes of this research, the prompt will be considered as framing the CMC, so that topics such as one's background, interest, and concepts such as "skeptical" or "convinced" can be used as sensitizing concepts for analysis (Blumer 1969: 148). The prompt instructions also contributed to the criteria for the response, so that each analyzed CMC was no more than 500 words. As individuals can be understood as responding to the blog prompt, these "blog respondents" will hereby be referred to as respondents.

When considering prior research, the concept of climate change rejection can offer particular insight into the disconnect between the scientific consensus and the public's stance (Weber 2011). The approach of CMC through a directed blog prompt can help to address rejection, particularly based in this blog's known stance as a choice of skeptics (Sharman 2014). In considering prior research on rejection, it has been shown that political and economic ideologies, media choices, conspiracy ideation, and questioning how the scientific knowledge is created are all factors associated with rejection of climate change. However, prior research also appeared to present a binary or dualistic stance of the public either accepting or rejecting climate change, or used predetermined categories or researcher based analytic categories. With this understanding, the current research chose to specifically use self-identified stances through in vivo coding to develop analytic categories, emerging from the data, as to the types of positions

respondents put forth in their blog responses. Building from this, prior findings were taken into account to determine what may be influential in developing these positions and treated these as sensitizing concepts during coding. Therefore, concepts such as “political ideology” were considered when first coding the data, but specific categories were allowed to emerge through the stages of coding, rather than using these concepts as pre-established categories to fit the data within.

First, using an initial analytic strategy outlined by Lamerichs and te Molder (2003) for analyzing CMC from the perspective of the respondent rather than that of the researcher, five initial grouping of responses were created based on the respondent identified position towards human made global warming and climate change, including "Acceptor", "Denier", "Skeptic", "Lukewarmer", and "Neutral / No discernible position"¹. These positions were created by examining the words and definitions the respondents used to define their viewpoints on climate change and global warming. Often, respondents referred to themselves in these terms like "Lukewarmer", "Skeptical", or "Denier", or implicitly stated their adherence to a position by describing their beliefs which fit into one of the categories established by others. Next, the

¹ "Neutral / No Discernible Position" will not be included in the analysis. The responses did not give enough information to make a determination of grouping via the analytical process used, and therefore, will not be analyzed for content. For example, these posts contained statements in which community participation was noted, but no clear position given: "Angech GP recently retired,love arguing and nit picking.contrarian and bombastic at times.Working on mellowing.", or in which a statement was made towards some scientific idea, but no clear implicit or explicit position could be understood, for example: "That's why CERES has a 5W/m2 missing radiation."

sensitizing concepts of conspiracy ideation, Climategate, motivated reasoning, media choice, and questioning how scientific knowledge is created were utilized to being the coding process with the assistance of NVivo, an assistive qualitative computer program. Ten codes were created: Work Background, and Education Background, Climategate, Conspiracy Ideation, Economics, Media Choice, Politics, Fear, Religion, and Science. Referring back to the literature, these ten codes were collapsed into four major thematic categories: Conspiracy Ideation, Motivated Reasoning, Media Choice, and Science Based Rejection. Comparison between these thematic categories revealed that in some cases, there existed an interaction of justifications given by respondents, such as conspiracy ideation based in economic motivated reasoning. So, while one theme can explain an individual's rejection of climate science for some, often an individual's rejection of climate science inhabits some or all of the thematic categories. This process led to an analytical classification of four positions towards human-made global warming, three of which reject some or all aspects of climate change. Among these three positions of rejection, four forms of reasonings are used by individuals to situate themselves in the climate debate. In the findings, the four positions are introduced, and then I examine how individuals draw from these four reasonings in different ways to situate their rejection of climate change.

CHAPTER FOUR: FINDINGS

The following sections are organized by the main categories and themes found in the analysis. The first section describes how respondents were positioned into four analytical categories based on their explicit or implicit rejection of climate change or related science: "Accepters", "Deniers", "Lukewarmers", and "Skeptics". Accepters provide a baseline in comparison of respondent's position, but because the main focus of this research is to analyze the methods used by respondents to reject climate change and climate science, the category of "Accepters" will not be analyzed beyond the first section. The following four sections then analyze the thematic categories of rejection as seen in the three categorizations found to reject at least some aspect of climate change.

How Do People Situate Themselves in the Climate Debate?

Initial analysis focused on describing how respondents viewed their own positions related to climate science. In their blog responses, respondents clarified their positions through expressions of their attitudes towards the consensus, climate change, and climate science. Prior research by Hobson and Niemeyer (2012) referenced the difficulty in this assessment of positioning, as their research only found a small percentage of their sample--less than 10 out of 103--explicitly or implicitly stated their position. In contrast, the current study found that 184 out of the 212 responses (86.8%) identified a position on climate change either explicitly or implicitly, while only 28 of the 212 (13.2%) took no discernible or a neutral position. Therefore, four analytically distinct positions can be derived from respondents' own descriptions and

identification, including their classifications, defined for the purposes of this analysis as statements that explicitly stated their position using the terms below and descriptions, which more implicitly supported a particular position in the debate: Accepters, Lukewarmers, Deniers, and Skeptics. These analytical categorizations show that climate science rejection is more complex than the simple acceptance or rejection often portrayed in quantitative literature.

Table 1 - Position

Position	Count	Key Concepts
Acceptor	11 (5.2%)	CO2 causes warming, humans responsible, support for science, accept consensus
Lukewarmer	27 (12.7%)	CO2 causes warming, humans responsible, skeptical of related science and consensus
Denier	48 (22.6%)	CO2 does not cause warming, humans not responsible, immovable position,
Skeptic	98 (46.2%)	Unsure if CO2 causes warming, unsure in humans are responsible, claims of openness to new evidence
No Position Given	28 (13.2%)	N/A

Accepters

Accepters of climate science did not identify using that label of “accepter”; however, the explanations of their positions all took the form of expressing acceptance of the basic idea underlining the consensus position that anthropogenic factors are the main cause of global

warming induced climate change. Findings from this research accordingly uphold previous research showing that acceptance of climate change is predicted by belief that the perception that a consensus exists amongst scientists (Lewandowsky et al. 2013b). Accepters' statements were explicitly in line with the science behind climate change and the scientific consensus position, with the exception of two which implicitly showed their acceptance through knowledge of details or comparison to other topic

As the smallest group, 11 of the 212 responses can be grouped into a position of accepting the scientific consensus of human-made global warming. Such respondents were classified as accepters due to their generally straightforward voicing of acceptance of the scientific research backing climate change, explicitly stating their support that climate change was occurring and humans were responsible. For instance,

Published my first paper showing that the observed climate change is most likely due to the anthropogenic greenhouse gas emissions in 1992. Haven't changed my mind. - Steven²³

I consider IPCC WG1 [Working Group 1, the main IPCC report] full reports well balanced, in general. I don't buy easily views that differ substantially from that in either direction. I think that the uncertainties are large, but not too large for drawing conclusions. - Peter

² All quotes are copied directly from the blog, so that phrasing, grammatical errors, or typos [sic] were left intact.

³ Pseudonyms are used for any respondents that seemingly used a real or full name.

I'm not skeptical of climate science. AGW is quite real as far as I'm concerned. - Bill

Some accepters were more cryptic in voicing their support, although the implications of their words can be understood as accepting climate change. One accepter, for example, explained a parallel between climate deniers and evolution deniers, using the notion of the process by which evolutionary theory has been refined as a parable for accepting the science behind climate change. While another accepter used recent events of weather to show their acceptance and understanding of the science behind climate change, making reference to the record snowfall produced in part by abnormally warm sea surface temperatures and the unusually colder air temperature in Boston compared to Alaska.

About a decade or more ago I was active on the evolution-creationists forums and encountered a cross-relationship between those rejecting evolution and the common ancestry of man/apes and those rejecting the findings of climate science.

AS with evolution I spent some time looking at the arguments and claims from both sides. Talkorigins v AnswersinGenesis and realclimate v WUWT [Names of websites for climate change information].

Despite some initial sympathy for the claims that the climate is too complex to analyse and any projection too uncertain to be useful, I was persuaded by the History of the development of the science, a close contemporary of Darwinian evolution, with similar major strides in the science emerging in the 1950-60s. That depth of development, and the way climate science and the GHE has been subject to strong selective pressure in the

ecology of scientific hypothesis for over a century and come out on top, makes me see those still rejecting its findings as the conceptual equals of those who refuse to accept the unity of terrestrial biology. - Izen

Digging out from record snowstorms in Boston and thinking about the collision between record ocean warmth in the north Atlantic and Arctic air descending upon NE. As I biked home this morning it was -2 with wind chills making it 10 lower but the temperature was 20 degrees higher in Fairbanks today. Reality bites - Ulyses

Although accepters expressed no contention with the basic scientific consensus, there existed room for difference in more nuanced concepts of mitigation and governmental policy as can be seen here in the differences between policy choice between Peter and Bill. Peter advocated for some immediate form of action, where as Bill finds immediate action can wait until we better understand future scenarios.

Where the uncertainties seem sometimes even too large is in assessing policy alternatives. I don't think that uncertainties on the strength of warming form a valid reason for not acting, but the difficulties in estimating where each policy choice leads is a bigger impediment. If it's unlikely that a specific decision is of any help, then that decision cannot be justified. Climate policy must be built on policies that can be sustained in real world political environment. It must also likely produce positive results. There are many weak choices that are expected to lead in the right direction, but even put together such choices may be too little to make a real dent in warming. - Peter

I am skeptical of doomsday scenarios. I think humans will deal with whatever changes come along, we seem to be quite ingenious. Also, trying to predict future technologies is silly, so I am very skeptical of carbon limiting policies; it assumes that what we are doing now is relevant to 2100. Wonks need to go back and read predictions made in 1915 regarding the 21st century. - Bill

These positions do not discount the basic premise of climate change, but instead question policy options towards climate change.

Accepters were not very well represented, which is congruent with the nature of this particular blog as skeptical of the mainstream scientific consensus. Due to the very nature of acceptance being related to belief that a consensus of scientists exists, this group will not be included in further analysis, as the focus of this particular study is on rejection. Overall, accepters position themselves in agreement with the consensus position that humans are responsible for current climate change and provide a distinction in comparison with the next group categorization, Lukewarmers.

Lukewarmers

27 of the 212 position themselves as Lukewarmers. The Lukewarmer position is not one of rejection of the scientific consensus on the anthropogenic cause of warming, but rejection of the outcomes and impacts associated with a warming world. Based on this distinction, one can classify them as accepting the basic position of the scientific consensus, that warming is caused

by humans, however, many object to the idea of a consensus position in science as not valid.

Many of the respondents directly outline this distinction in their responses.

I consider myself a “lukewarmist”, in the sense that I accept that CO₂ is a greenhouse gas and a doubling of it likely results in something on the order of 1C increase in atmospheric temp from direct causation. It’s the feedbacks where the real question is, IMO. I remain highly skeptical they are positive on the scale which IPCC tells us is true. - geo

I have since moved to my current Lukewarmer status, as good people (mostly but not all) in the blogosphere walked me through various elements of the science and answered a host of questions. I have no issues with the science, although it’s clear many questions still need to be answered. My continued participation in the climate conversation is focused on attribution, adaptation and impacts—and the nature of the debate itself. - *twf*

I guess I would put myself in the lukewarmer category. I certainly believe in the physics of greenhouse gases, etc., but think there has been way too much hype and exaggeration about global warming/climate change. - Mike

Even though Lukewarmers broadly accept the science, it does not necessarily mean they agree with the scientific consensus or view it in a positive light. Commonly, Lukewarmers that explicitly express acceptance of the underlying scientific evidence supporting the consensus have negative views of the scientific consensus.

The climate consensus is playing with big budgets, close connections and no scruples in a struggle to control the language and grammar of the debate. - twf

I guess that makes me a lukewarmer. I still believe that the burden of proof is on climate science community to prove that the amplification processes will in fact amplify the warming resulting from CO2.

Two things make me assert that the burden of proof has not been met: first, the scientific behavior of the climate science community has been execrable. Acceptance of clearly erroneous papers, such as those from Mann et al., pasted-together climate reconstructions, a tendency to jump on every temperature blip as proof of imminent catastrophe, etc. all serve to show that the community is less interested in communicating the truth than it is in maintaining a narrative of impending doom. - fizzymagic

Some Lukewarmers also take the position that while human-made warming is happening, that it may actually be beneficial or that the impacts are far enough away to not currently require mitigation. For instance, RB stated that ‘the very cogent middle-ground of ‘lukewarming’—and the positive side of man-made warming, CO2 fertilization, and fossil-fuel appreciation.” while John declared, "Bottom line: the problem is real, but for the next century is quite overstated. And: we will deal with the problem this century."

The Lukewarmer categorization is unique as it represents a middle ground between accepting of the basic consensus idea that humans are responsible for the current warming, but rejecting the idea of consensus itself and consensus science ideas on the outcomes and effects of

the warming. This nuance separates them from accepters; although as accepters may debate specific policy options, Lukewarmers find there to be no reason for policy as the effects of warming will either be not harmful or possibly beneficial. Beyond that, Lukewarmers' rejection of other areas of climate science makes them an interesting case to study to determine if the methods used for rejection differ from those who reject the consensus position. This will be examined in the following sections.

Deniers

48 of the 212 respondents, making up the second largest group, can be defined as deniers due to their expressed outright rejection of the consensus or of concepts that the consensus is based on, such as the greenhouse effect. Most implicitly identified their position by denying basic scientific concepts that form the basis for a consensus position, such as carbon dioxide (CO₂) being defined as a greenhouse gas. MR, WJ, and CH's responses show this rejection of the gas's physical properties.

I find the lack of evidence for such simple things as CO₂ radiative “forcing” in the temperature record to be appalling, considering how much undue weight it is given." - MR

Some say, “I know CO₂ is a greenhouse gas. I know it will cause back-radiation.” Please, how do you know that? Atmospheric CO₂ and H₂O “absorb” no EM flux, as they pass all onto space along with there own contribution to exit flux." - WJ,

I became suspicious of the theory early on when I realized what a small contribution, by volume, manmade CO2 actually was in relation to the overall volume of gasses in the atmosphere." - CH.

In one example, the entire field of climate science was dismissed by a comparison to Astrology, "So I don't believe that climate science is a field of science at all. You might as well do astrology." - rar

Deniers were very straightforward in voicing their dissent, sometimes even taking sarcastic and mocking tones. This example was only found within the denier group, suggesting a harshness or nastiness to the online debate. For instance, Michael used allusion to Stalinism, fascism, and conspiracy to express his rejection of climate science through a mocking imitation of an "Accepter" comment.

I'm an hysterical alarmist, warmist, Stalinist and all round nasty piece of work.

I failed primary school maths, but can count to 20 (with my shoes off).

I can't think for myself, but am able to slavishly follow the commands of the AGW overlords, Gore and Mann.

I believe in the IPCC and in the coming salvation via black helicopters.

CE is the best because of the absence of negative stereo-typing of those with whom you disagree, the complete lack of motivated reasoning and because the denizens seem to be the smartest, nicest, most rational and clear thinking people to have ever walked the

earth, in contrast to the dirty filthy warmists who seem blissfully unaware of their own extreme cognitive biases, lemming-like behaviour and general inability to do science properly while scamming grants to promote the AGW fraud.

Based on key traits of discussion, denier appeared most resolute in their position, and most combative against positions of acceptance. Unlike the other groups, Deniers explicitly addressed other positions, some instances through sarcasm, to help establish their own position. Deniers often rejected the field of climate science as a whole, taking the position that all of it was fraudulent. These methods of rejection aid in making their position well defined, which arguably can increase solidarity of those within-group. In turn, this can lead to a more steadfast position that is difficult to challenge.

Skeptics

Skeptics made up the largest proportion of respondents with 98 of the 212 respondents, defined as skeptical due to their overall uncertainty surrounding human-made climate change. The reasons vary greatly between respondents for their skepticism; however, each post focused on the commonality of questioning the scientific consensus. Unlike Deniers, Skeptics' posts suggested a potential for a change of position given the right evidence, or simply due to the fact that they were too unsure to make a decision.

"I am not persuaded that human caused GHG emissions are a serious threat to life or to humanity. However, I accept there is some risk of net negative economic impacts in the distant future.

We don't know if GHG emissions are doing more harm or more good. We need probability distributions for: time to the next abrupt change, whether it will be a warming or a cooling, its rate of change, duration and maximum amount of the change and, most importantly, the impacts." - PL

My skepticism about "official" climate science started in the early 1990's when I attended seminars discussing official measurements of average global temperatures. - PH

I am a skeptic, I ask but one question, have for over 12 months and received zero answers to the question. The question: if adding 120 PPM of CO2 drives temperature, where is the experiment that proves this theory? It's as simple as that. - jc456

From the perspective of the researcher it may be argued that there is no difference between Deniers and Skeptics as they both explicitly question the consensus on global warming, however, there is a slight difference in their position. Deniers take a steadfast approach in voicing their rejection of the science; their posts appear to leave no room for the possibility of evidence to convince them to change their stated perspective. Portrayals by Skeptics, on the other hand, suggest a willingness to be exposed to other evidence that may change their position, akin to a literal skeptical position. The same could be said for Accepters and Lukewarmers that both are in agreement that humans are responsible for the warming, yet differ in outcomes and mitigation strategies. Therefore, for the purpose of this research, Deniers, Lukewarmers, and Skeptics will be treated as unique categories due to these nuances in constructed positions.

This overview of the four groups provides general distinctions from one another that will serve as a basis for contrast and comparison both between and within groups. Many respondents labeled themselves into these grouping by their use of these labels; however, the majority did not. Instead, their ideas and stated positions were used to group them into the categories they best fit with. Of these four groups, the focus of the analysis will be on the three that reject some aspect of the scientific position on climate change: Deniers, Lukewarmers, and Skeptics.

Media Influence

Previous research indicated media influence as one of the largest factors in opinion formation on climate change (Brulle et al. 2012; Portinga et al. 2011; Whitmarsh 2011). The following findings uphold the importance of media influence, with a large percentage of posts including references to media. Both Skeptics and Lukewarmers referenced media in roughly 25% of their posts, with Deniers referencing media about half as frequently. Unlike the television or print media which portrays climate change through a false balance that promotes "balance as bias" coverage (Boykoff and Boykoff 2004), the internet has entire websites dedicated to promoting only one side of the climate change debate (Sharman 2014). Arguably, the same mechanism that effects television viewers who, after viewing material that presents climate change as "weak" or "flawed", report lower rates of acceptance of climate change (Gavin and Marshall 2011), would also apply to those who get their information on the topic online.

The sources people choose to obtain their information from represents an exposure to ideas and explanations in the global warming. This choice in which media respondent state they consume can be used as a proxy for media influence. People rely on the interpretations of these sources for accurate information as most scientific articles exist behind paywalls or have other limitations to access. Therefore, media choice plays a very important role of base exposure to ideas which, right or wrong, aid in creating a bias towards those ideas. In relation to media influence, Deniers rarely referred to media choice; alternatively, a greater percentage of Skeptics and Lukewarmers referred to media choice.

Table 2 - Mention of Media Choice by Position

Position	Count	Key Concepts
Denier	6 (12.5%)	Only contrarian sources, politics, conspiracy
Lukewarmer	7 (25.9%)	Both contrarian and consensus sources, questioned the work of one particular scientist
Skeptic	23 (23.4 %)	Only contrarian sources, confirmation bias, dismissive of consensus

Deniers

Only 6 of the 48 (13%) of Deniers mentioned media choice in their responses. Media choice didn't seem to be important for this group, however, their choice in media was always one of the top ten most central climate skeptical blogs. Even within the six mentions of media sources, respondents positioned themselves differently in regards to their media choices .One respondent simply mentioned their main sources of information providing no additional commentary or reasoning as to why they chose their sources: "Online, I follow Climate Etc., WUWT, Real Science/Steve Goddard, Tom Nelson, Pielkie Jr., Climate Audit, JoNova, nofrakkingconsensus.com, Dr. Roy Spencer, Bjoern Lomborg, and Lord Monckton – among others." - sdh

The other 5 gave explicit reasons for their choices in media. DaveW argued that his media choices provided for a better sense of balanced reporting when compared to mainstream sources of information:

WUWT soon became my main source of information, but its content is highly variable in quality and often unscientific. World Climate Report was better, now but more or less moribund. Now I rely on Climate Audit, Climate Etc., JoNova and Don Aitkin for climate news and William Briggs for entertainment. They provide a balance not found in the MSM [main stream media].

Eliza pointed to one source specifically and focused of a conspiratorial notion that the skeptic sides document "fraud and lies":

I think it should be recognized that probably the one site that has done the most damage to the AGW matra is not here, or WUWT or Climate Audit, it is Steven Goddards site real science who has carefully documented all the fraud and lies through data analysis of raw data, adjustments and yes newspaper articles from the past and present time, carefully documenting every statement made by these fraudsters, and of course Paul Homewood, more recently and Mahorasy in Australia

Otter saw political bias in the reporting of climate science and went with skeptical websites instead of a science communication website:"I found WUWT almost the day Anthony put it up. I found john cook's site almost the same time. It became obvious very quickly who was being honest, and who was not. The political / ideological posturing by warmists is all too obvious."

Rt took a more analytical approach saying that skeptic blogs just made more sense: "I'd switch back and forth between Real Climate, Skeptical Science and the skeptic blog posts, and yet the

skeptic stuff just kept making more sense to me." While GS was simply "appreciative of the rigour and good spirit of Climate Audit"

While media choice was not frequently cited by deniers, these examples show variation in reasoning for media choice, but also that media choice for some is linked to other factors such as political ideology and conspiracy ideation. Deniers therefore explained their media choices through “skeptic” information, using terms referencing intellectual and emotional appeal, particularly based in the notion that the media is not providing both sides of the story.

Lukewarmers

For Lukewarmers, 7 of 27 mentioned some aspect of media choice in their responses. Of these, 5 were simple mentions of media choice and 2 gave more detailed explanations of why their particular choice in media was chosen. Of the 5 simple mentions, only 1 was composed of climate skeptical sources: "By 2009 I had discovered WUWT and then the climategate emails were posted. What I saw there was unimaginable in my mind. For a while I was a hardcore denier. Eventually I stumbled into the scienceofdoom website and then here to Judy's interesting blog." - DP

The other 4 statements also included Real Climate, a website run by scientists, as a part of the consensus: "I started to check websites such as ICECAP, Climate Audit, WattsUp, Real Climate and BishopHill, and got interested." - TW, "Blogs read: Climate Audit, Bishop Hill, Climate Etc, Blackboard, RealClimate, WUWT (selected articles only, generally Willis)." - SR, "I regularly scan CE, Climate Audit, WUWT, JoNova, BishopHill, GWPF, and Paul Homewood. Just

discovered Paul Matthews. Less regularly Pielke Jr., Tol, and Steele. Sometimes a thread leads to places like SoD. Occasionally check RealClimate to see what the consensus is saying." - RI, and "After years of reading climate audit, this site, WUWT, bishop hill, real climate and a few others I have switched to a lukewarmer." - Tim

Lukewarmers also focused on some media that specifically attempted to discredit a specific scientist Michael Mann. Two took positions on media that directly questioned his work. Mann's research focuses primarily on a temperature reconstruction nicknamed "The Hockeystick", which was featured in Al Gore's "An Inconvenient Truth", a mainstream documentary that brought the issue of dangerous climate change into the public realm.

One of the first big red flags was when McIntyre and McKittrick demolished Mann's hockey-stick papers, and instead of admitting that maybe there were some problems with his analysis, Mann and his cohort refused to give an inch and instead demonized them and anybody else who dared to question him. - Mike

I read the Mann papers and Climate Audit and had a real problem with Mann trying to disappear the MWP or arguing that it was merely regional. - Rick

Lukewarmers, true to their "on the fence position", seem generally willing to engage in media choices that include a website that represents the scientific consensus. Even mentions of other sources of media, such as in regard to Michael Mann, do not explicitly rebut the consensus position of human-made global warming, but rather reject the work of Mann in paleo-temperature reconstruction. This, in turn, supports the notion that the consensus position of

human-made global warming is not rejected by Lukewarmers, but instead other aspects of climate science.

Skeptics

23 out of the 98 skeptics mentioned some form of media choice in their responses. Out of these mentions, 12 only stated their media choice without additional information, 8 reflect what can be understood as confirmation bias, and 3 specifically reject a mainstream source of information on climate change.

In the largest number of mentions, skeptics listed their top choices for information, which include climate skeptic websites and writers. Similar to Deniers, these mentions did not offer in-depth explanations for why they were the respondents' top choices, although certain mentions did explain their choices due to what they defined as hard and/or quality work by the sources. For instance,

I have been mightily impressed by the highly technical work and persistence of the likes of Steve McIntyre, Ross M, Nic Lewis and others. I also admire the work and perspective of Nigel Lawson, Rupert Darwall, Matt Ridley and Benny Peiser.

While MS offered some insight into their choices, JC simply listed the top sources, although this offers insight into their interest in the topic due to their proclaimed frequent visits to the site:

I devoured dozens of climate sites and within a few years I visited never less than six sites a day (plus links). These days I have my old favourites of WUWT, Climate Audit,

Bishop Hill, The HockeySchtick,

Climate etc, JoNova that I mostly read everyday plus some floaters like Matt Ridley, C3, Climate Skeptic and A Chemist in Langley"

Alternatively, in what can be understood as confirmation bias, eight of the comments explicitly stated their media choice confirmed some prior aspect of their skepticism of global warming. For example, CN explained that "Reading the Hockey Stick Illusion and The Deniers and Steve McIntyre on Climate Audit has re-nforced [sic] my skepticism."; this is similar to LW's statements that they "Began reading the literature on CO2, paleo, read Plimer, discovered WUWT, Climate Audit, and Bishop Hill. Climategate and the Hockey Stick Illusion confirmed my skepticism." PH offers insight into what started them on their path to skepticism and led to their future choices of media information, explaining that "The best I can recall, I came to Climate Audit, Steve McIntyre, Ross M, Roger Jr., Bishop Hill, Jeff ID and others when I read early in 2000 about Steve's finding regarding some of Hansen's errors." Such explanations therefore, while listing their choices, also offer insight into the background of the skeptics' media choices.

While certain skeptics thus predominately listed their media choices, without offering much explanation over the specific influence they had on their positioning, three other skeptics mentioned some aspect of the consensus or consensus related websites in a dismissive or derogatory way. Similar to how deniers created boundaries through distancing from certain positions through skepticism, these quotes help to define their position not only through listing

their media choices but also by distancing from sources they no longer find credible. For example,

I still read WUWT, GWPF but also read ATTP, Jo Nova, Real Science, IPCC Report, Bishop Hill, No Tricks Zone, Climatecontrarian, IMABlawg, Shub Niggurath as well as Judith's site and occasionally The Great White Con, Skeptical Science and Real Climate but I find those 3 difficult to take seriously - BB

Steve's explanation of his media choices also helps to define the position of a skeptic, associating them with "good scientists" but also clarifying their position as self-doubt, distinguishing skeptics from "true believers."

I also follow WUWT, Climate Audit, Bishop Hill, and Hockey Schtick. In the past I regularly read Real Climate, but it is more a site for true believers who never have self doubt (which is the opposite attitude of all good scientists who I know), so I only go there occasionally to see what the consensus is upset about. – Steve

Referring back to the aspect of quality work, Curt's explanation both distances from certain sources and helps to define the skeptic as one that is concerned with "good" blogs—and thus "good" information—that considers multiple perspectives.

So I started looking online for better information. I first found Real Climate, but I was quickly put off by both its content and style. The good skeptic blogs were more careful

technically, willing to link to opposing blog arguments, and much more willing to respond to criticism rather than censoring it. - Curt

Both Skeptics and Deniers only considered skeptical sources to be valid sources of information, while Lukewarmers considered consensus sources of information as valid along with the skeptical sources. This adds support to the idea of media having an influence on climate change opinion formation in all three groups with Lukewarmers possibly being influenced by both contrarian and scientific sources; however, there was also evidence to suggest that media sources were sought out to confirm previously held ideas. Skeptics were the only group to mention confirmation of previously held beliefs by media choice; however, multiple deniers mentioned that they found the specific messages of skeptical media to influence their choices of which media sources to trust.

Conspiracy Ideation

Belief in conspiracy theories has been found to be an important predictor of climate science rejection through the idea that belief in any conspiracy theory would make individuals more likely to engage in conspiracy ideation as an alternative solution to the scientific consensus (Lewandowsky 2013b). While previous focus was mainly on non climate change related conspiracy, one related conspiracy was mentioned as particularly relevant to climate change, the idea of a complex, secretive collusion amongst scientists and researchers. This particular conspiracy was found to exist within all groups in the study.

One very prevalent variation of this particular conspiracy theory is an incident known as Climategate. Climategate was the release of hacked e-mails obtained from the University of East Angila's Climatic Research Unit. The e-mails were released, without context, in an effort to show the conspiracy between prominent climate scientists to manipulate data. Eight separate governmental and institutional committees were formed in Europe and the United States to investigate the e-mails to determine if fraud was committed by the scientists and organizations in question. All eight found no wrong doing and no evidence of fraud. Despite this, Climategate was used to question the consensus.

Table 3 - Conspiracy Ideation by Position

Position	Count	Key Concepts
Denier	38 (79.2%)	Climategate, Politics, Economics
Lukewarmer	20 (74.1%)	Climategate, Politics, Economics, only questioned related science, not basic concepts
Skeptic	67 (68.4%)	Climategate, Politics, Economics, Poverty

Deniers

Of the 48 denier responses, there were 38 mentions of some form of conspiracy theory. Most of these mentions were the standard belief of the collusion of scientists, while 13 of those 38 referenced Climategate. Conspiracy often involved an academic aspect and the idea the data have been manipulated. HTD framed global warming as an issue that only exists within academia, suggesting poor scholarship is the reason for the scientific collusion.

Global warming always struck me as stupid because everything that was said to be ‘unprecedented’ was so obviously not. Plus it’s not a real world thing – it’s academic. Academe is, after all, where the second rate go to practice third rate behaviours without consequence (pace Dr Curry).

Along similar lines, RS places the blame on the scientists directly stating that the data has been manipulated, stating "My philosophy is to follow the data in science and engineering, but

the data must be verified, valid data. Manipulated data, falsified data, and omitted data, are among the worst forms of Bad Science."

While RP makes the conspiracy out to involve the United Nations and a goal to manipulate and orchestrate policy decisions on a global level.

The IPCC is actually a relatively small group of individuals who are using the IPCC process to control what policymakers and the public learn about climate on multi-decadal time scales. This NRC planning process further demonstrates the intent of the IPCC members to manipulate the science, so that their viewpoints are the only ones that reach the policymakers.

Climategate was more often mentioned as direct evidence for rejection of climate science, directly using this event to call the science into question. DW uses Climategate as evidence that a group of scientists exist, who control the creation of data, "Climategate had a profound affect in that it made clear the cabal at the centre of the hockey stick and temperature reconstructions were not to be trusted. This reinforced my conclusion that no one seemed to really know what they were doing", and AJ uses Climategate as evidence that the scientific community was wrong for not apologizing and condoning the behavior of the scientists, "After the Hockeystick- and Climategate-scandals I was more or less convinced that there is something very wrong with climate science. I was especially shocked that those who misbehaved did not apology and the scientific community did not condemn such a behavior."

Conspiracy ideation was also found to be related to some aspects of motivated reasoning through economic or political means. The conspiracy took the form of the initial "collusion amongst scientists" theory, but then added some aspect of justification like money or political affiliation. For example, CH believes that politics is what drives climate science,

My current view is that a great portion of “pro-AGW” scientific work is more driven by self-interest and politics than by any real curiosity about scientific truth. In politics, a “natural conspiracy” may be expected to form in support of whatever any particular party line may be fashionable. I’m afraid the same can be said of climate science, thanks to a reward system that offers fame and fortune to those who “tow the party line” and a whole heap of the opposite to those who do not tow that line.

Along the same lines, MR takes a position that the goal of scientists is world domination through global social and economic change, "It is clear that the global warming scare is highly politicized [sic] with the motives of the UN/IPCC unashamedly and publicly being global social/economic change rather than anything to do with the climate."

Deniers use conspiracy to justify their beliefs that climate change cannot be real, because of some aspect of fraud, manipulation to aid in some nefarious means. Often these conspiracies bleed into economic or political ideology, allowing deniers to position themselves against these ideological stances they disagree with. Deniers also engaged in conspiracy ideation more often than the other groups (79%), suggesting that the creation of alternative explanations is highly important for individuals to justify their positions against scientific evidence to the contrary.

Lukewarmers

For Lukewarmers, the same basic conspiracy types existed with 20 mentions of conspiracy out of the 27 responses, but the framing of what the conspiracy involved was different. Instead of attacking the basic premise of the science, like CO2 induced warming, the conspiracy ideation was more directed at other aspects of the science Lukewarmers felt was still up for debate, like accuracy or outcomes. Regardless of what the question the conspiracy was providing an alternative explanation for, the general theories were very similar. John does not question the idea of CO2 induced warming, but instead believes the motives of the IPCC may be compromised by scientific collusion,

That incident fueled my skepticism from that point, not about whether CO2 and methane and black carbon could warm the planet, but rather about the motives and scientific accuracy of major proponents, such as the IPCC and the people who headed up scientific core areas for the IPCC (including Mann).

Other Lukewarmers were concerned that collusion among scientists falsified beliefs in the outcomes of climate change. Nc stated, "My posts were middle of the road observations about ideas like groupthink influencing the mass belief in a catastrophic outcome."

Lukewarmers also brought up Climategate in 10 out of the 20 mentions of conspiracy, but used it to question things other than the basic scientific evidence and mainly used it to reinforce their notions that some part of the science is incorrect. KH used Climategate to justify waiting decades to take any action on climate change, "Glancing at my postings, I see a

hardening of my position as a lukewarmist in 2009 with Climategate sealing the deal. At that point, I resolved to wait and see for a couple of decades, the future being evidence that couldn't be manipulated.", while GH used climategate and personal experience to confirm his belief that there is real reason to question the science, "Then we had the hockey stick and climate gate, compounded by large parts of the scientific establishment closing ranks and saying "nothing to see here". Er, no. I was in and around academia for long enough to know this is not how honest scientists conduct themselves."

Motivated reasoning was intertwined in some aspects of conspiracy ideation for Lukewarmers as well. Economics and politics were mentioned as driving factors behind scientific collusion. Twf uses an economic framing for the reason for collusion amongst scientists, "The climate consensus is playing with big budgets, close connections and no scruples in a struggle to control the language and grammar of the debate." Mike takes the approach of comparing scientists to activists, suggesting that the collusion is the result of politics," Climategate confirmed what I already suspected was the case — that there is an influential group within climate science who are behaving more like political activists than scientists."

Lukewarmers use the same conspiracy creations as the Deniers, and roughly at the same rate (74%). Unlike the Deniers, Lukewarmers use conspiracy to question other aspects of science while keeping their belief in the basic idea that humans are responsible for the warming. Climategate was a very important issue for Lukewarmers as 50% of the mentions of conspiracy pertained to it. Lukewarmers also intertwined motivate reasoning into their conspiracies using politics and economics to explain why the conspiracy existed.

Skeptics

Of the 98 skeptical responses, there were 67 mentions of conspiracy. Skeptical conspiracy ideation was also based in the premise that scientists were colluding to produce certain results, and that these collusions were justification for their skepticism. Respondents focused on the manipulation of results to justify skepticism,

From there the work of the two Macs and it was clear that there isn't even the most basic proof that we are witnessing events outside natural variation on a climatic time scale. The scandals that followed, where practitioners in the field needed to manipulate results, hide shortcomings and withhold data only convinced me that the prime face case that this is "unique" is weak, so the case for anthropogenic causation is weaker still. - GO

DG believes the collusion has created a culture of "groupthink" within climate science, leading to a forced collusion to be part of the crowd, "The years spent in large organizations also made me well aware of the institutional imperative and the dangers/perils of groupthink. I've seen far too many examples of Extraordinary Popular Delusions and the Madness Of Crowds."

Climategate was much less important for Skeptics, only being brought up in 22 of the 67 mentions of conspiracy. Like other conspiracy, Climategate was used as justification for skepticism over the science of climate change. One respondent saw Climategate as proof that scientists were falsifying data and suppressing alternate ideas, "Then came Climategate and the unthinkable became reality. The scientists really were fiddling to get the right results, ruining the

careers of people who had different scientific views and refusing to show where the data and workings for the papers used by the IPCC came from." - Gerome

As a skeptic, TK sees Climategate as evidence to question the science, but also sees the release of the hacked e-mails as evidence that honest people still exist within the field. He refers directly to one specific statement from the e-mails in which a scientist uses the term "hide the decline",

Finally during ClimateGate having been a FORTRAN programmer in the past, I looked closely at the code where amazingly duplicitous changes were made to "hide the decline". I don't know how these people sleep at night – of course some one published the ClimateGate emails so maybe there is still a few honest people left."

Like the Lukewarmers and Deniers, other aspects of motivated reasoning, mainly economics, were used in conjunction with conspiracy ideation. MS, uses the idea that a redistribution of wealth is the nefarious goal of an organized group pulling the strings of the scientists, "The misuse of the GCM's [General Circulation Models] by the alarmist "(warmunist," as Rud calls them) crowd to project future catastrophe in order to abet attempts by the UN and the Progressive Green Mafia to reshape the entire world economy is obvious." FR, sees the conspiracy as an anti-capitalist plot, "Many of the people pushing the danger are radical extremists who seem to hate any human activity and use the threat of AGW to halt the dreaded consumers from consuming.", and PE and Tnk thinks the collusion is related to scientific funding in academia, "My understanding of individual and group behavior tells me that when grants are awarded based on alarm, you will find alarm" and "Academics have plenty of career-enhancing

reasons to try to push their research among their colleagues, brushing over any flaws in that research, and some of them particularly enjoy being in the spotlight of public attention. It is all too tempting to try to make sure that one's results goes with the current conventional wisdom so that grants, tenure, and promotion will come one's way."

However, the skeptics used conspiracy ideation in a unique way, implying that the collusions of researchers had more nefarious means. These ideations involved scientists being part of a conspiracy to kill the poor in developing nations or to limit the growth of civilization..

Sometimes I get pretty depressed about turning corn into fuel, whacking eagles out of the sky by blades or frying them by reflecting light into a parabolic concentrator, demonizing clean safe cheap nuclear power, killing the poor by the hundreds of thousands perhaps millions by denying them food and cheap energy. - LW

Motivated reasoning was also used in conjunction with these specific conspiracies. In this response, the death of the poor is to protect the financial interests of the rich,

Furthermore the ethics is indeed also clear; it is morally reprehensible to condemn millions (if not billions) of the world's poor to energy poverty, suffering, and possible premature death to save the world's future rich from the potential inconvenience of adapting to their climate. Why is this still a thing? Perhaps it's politics, because it's certainly not science or ethics. - JW

The use of political ideology was also employed here. RL makes the claim that political motivation is limiting the solutions to any possible change, and that this motivation is against civilization,

Then when it came to “solutions” – every sensible one was taken off the table. Relegating hydroelectric power to non-renewable categories, denouncing nuclear – the only truly carbon free option etc. Promoting unworkable concepts: wind, solar and energy reduction as the answers- it was clear that this was a political movement, and really an anti-civilization one at that. - RL

Conspiracy ideation was similar across the three groups; however differences existed in how the conspiracy was used. Deniers and Skeptics used conspiracy to dispute the consensus positions, while Lukewarmers used conspiracy to dispute other scientific concepts related to mitigation or effects of warming. All three groups use on conspiracy ideation as an alternative explanation had instances where the ideation was intertwined with economic and political motivated reasoning. This combination of typologies suggests that alternative conspiratorial explanations for some individuals must also be rooted in an emotional bias, that simple distrust or suspicion of scientists or science is not strong enough on its own for some. Climategate was referenced the least by the Skeptic group, than the Lukewarmers and Deniers. This could mean that Climategate holds less importance across the Skeptical group.

The most interesting finding is the usage of conspiracy ideation by Skeptics to frame scientists as unethical for pushing an agenda that is anti-poor, anti-civilization, and that will

result in the death. This demonization may act as an extreme version of the interaction of conspiracy ideation and motivated reasoning where the respondent needs to create the alternative explanation that scientists are actively engaging in the most unethical of behaviors, direct neglect of human life through purposeful manipulation, in order to reject or question climate change.

Motivated Reasoning

Motivated reasoning has been looked at extensively as a major factor in rejection of climate change. Motivated reasoning can best be described as the emotionally biased processes that help evaluate and construct beliefs (Kunda 1990). In particular, political ideology and economic ideology are both predictors of rejection of climate change (Heath and Gifford 2006; Lewandowsky et al. 2013a; Lewandowsky et al. 2013b). However, other aspects have been researched, like education which has been seen as a positive factor in climate science acceptance, but a negative or neutral factor, moderated by political ideology, in rejection of climate science (McCright and Dunlap 2011).

Political and economic ideology was found to be important factors in all groups rejection of climate science, but they were not the only ideological reasons discovered. Educational and work background as well as religion seems to play an important role in reasoning behind rejection of the science. Instead of educational attainment, actual experiences through their education and work histories were shown to be at least partially responsible for justifying their rejection of science. Religion's effect was through two separate means, one in which climate change, the scientists, and the science were being framed as religion and therefore rejected, the other a religious objection to the realities of climate change. Not all of these mentions were explicit statements related to the rejection of science; however, they do provide information about the respondent's makeup allowing their references to these concepts to serve as indicators of potential bias in evaluating and constructing beliefs on climate change and science. It is to be noted that the prompt did ask respondents to list their background, however, respondents then

often used their background to link to their reasoning behind rejecting the science, but not all mentions of work and education were used in this way.

Table 4 - Motivated Reasoning by Position

Position	Count	Key Concepts
Denier	Economic 9 (18.8%), Political 18 (37.5%), Religion 7 (14.6%), Education and Work 31 (64.6%)	Free market, economic conspiracy, conservative, global warming as religion, religious justification for rejection, work experience
Lukewarmer	Economic 5 (18.5%), Political 4 (14.8%), Religion 2 (7.4%), Education and Work 21 (77.8%)	Free market, taxes, costs, global warming as a cult, focus on educational experience
Skeptic	Economics 14 (14.3%), Politics 28 (28.6%), Religion 14 (14.3%), Education and Work 81 (82.7%)	Free market, taxes, government spending, conservative, global warming as religion, use religion to frame skepticism, mix of educational and work

Deniers

Of the 48 denier posts, there were 18 mentions of political ideology, 9 mentions of economic ideology, 7 mentions of religion, and 31 mentions of educational or work experience. Denier's used these to cast doubt on and support their notions rejecting the science behind climate change. Political themes were generally from a conservative point of view, pointing to global warming as a left wing creation. SF equates environmentalism with other traditionally liberal fights for justice,

I first became aware of the 'environmental movement' on the very first Earth Day, when I stopped studying physical chemistry and differential equations long enough to wander around campus and listen to the speeches. I thought I might have been at the wrong place... there was little substantive discussion of environmental issues, but endless tirades on the evils of capitalism, material wealth, and differences in income between rich and poor.

Economic ideology was found to be an influential factor with free market ideology in regards to taxes being represented by deniers, "I am for spending money collected via taxes to fund innovation into unsubsidized yet parity competitive alternative energy." - CE; However, mention of economics as a reasoning for conspiracy was a much more prevalent position to take, posing the idea that the scientists are directly profiting from global warming, FC believes that "People such as Hansen line their pockets with alarmist cash while making pronouncements that are false. In any other line of work people would go to jail for such deceit.", while SM posits that without the money, climate change would simply cease to exist as a major topic, "The money has really corrupted the entire issue, so I understand why there are a lot of believers in positions of power (and money), if the money disappeared this would fall into the same category as talking about the weather."

Religion was used in competing ways. Most commonly, religion was used to frame belief in global warming in order to reject it. Lori stated,

I hark back to Quaker meeting yesterday and the idea expressed, that most folk (except the crazed fundamentalists) were, mostly, abandoning the orthodoxy, the dogma, more accepting. Nah. Sadly, those are the folk who have bought into the virgin birth of global warming, never to be challenged, thought about, contradicted. They are the supporters of the imposition of fascism upon all, in the name of good.

However, one respondent took the opposite approach and used religious belief as a justification for why climate change wasn't happening, "Being a God fearing Christian, I noted straight away that the world dying in a catastrophic warming, was not in the bible. It tells another story" - GC

Work and education were the most mentioned, with respondents relying on knowledge learned through work or their education to inform their positions. MD uses his knowledge from being a mechanical engineer to question climate modeling, "I'm just an old mechanical engineer and the whole idea that some scientists have the global climate system accurately modelled just pegged my BS meter even before I read about the hockey stick and climategate", EA uses his work experience as a dentist to compare medical and climate science, justifying his rejection of climate change, "I have been fascinated by weather as long as I can remember. As a dentist, I understand the scientific method, and recognize that most of these studies which support AGW would not fly in the medical community as proof of anything. I am amazed someone is actually providing the funds for these studies."

Deniers engaged in motivated reasoning to reject the science, focusing heavily on their work experiences, and political ideology. Religion was used as both a tool to reject climate

change as a religious entity and to reject climate change from a stance of religious end of the world revelation, but was as not frequently mentioned as the other typologies.

Lukewarmers

Of the 27 Lukewarmer responses, respondents were less likely to use politics, economics, or religion as reasoning for their rejection than Skeptics or Deniers. There were only 4 mentions of politics, 5 mentions of economics, and 2 mentions of religion. Lukewarmers were very likely to share their background however, with 21 of the 27 mentioning either education or work experience.

Lukewarmers used politics to frame climate change as a left wing, liberal issue. CM states that, "I hold a lukewarmer position and I'm concerned about how the climate issue seems to appeal to left wing activists, politicians and people who fly around on private jets." Greg was more implicit in his use of politics, referring to famous community organizer Saul Alinsky, "I am a luke warmer / skeptic. I believe in the basic physics, but not in the feedbacks necessary to cause future pain. Main reason for skepticism is the seeming need for believer scientists to use all the classic Alinsky tactics, lie exaggerates and vilifies those who disagree."

Economics was used to question mitigation and the costs associated with mitigation. Free market principles were evident here with mentions of taxation and risk/cost benefits. Ftw took issue with the concept of a Carbon Tax, one of the main ideas floated for mitigation,

Should we turn our economy upside down to reduce CO₂? Well it probably wouldn't hurt, but not so we impoverish ourselves or stop development in the third world because we just don't have enough to go on for that kind of sacrifice. Should we tax CO₂? Ah ha! THAT is the real source of this frenzy. There are a lot of taxes to be made by taxing CO₂ and therefore it is far too attractive to those in favour of big government looking for yet another reason to redistribute wealth. How can they possibly resist embracing that? To me it is the ultimate in conflict of interest for government to pursue carbon taxes to tackle climate change.

Rick took the position that the costs outweigh the benefits for any mitigation, suggesting, against the predominant scientific knowledge that we wait for more data,

I don't believe a proper cost/benefit analysis has been done yet. It is my opinion that the costs of mitigation are huge and dwarf the benefits.

Raising the costs of 7.5 billion people's food, energy and fuel in order to maybe slow down warming by less than .1C/decade seems like a very risky thing to do to me, and I want to see 60 to 120 years more data to really tease out the human signal from the background natural variability signal.

Religion was only mentioned twice. These instances painted climate change with "cultist" and religious imagery, using this framing to reject the aspects of the science they do not agree with. GH focused on computer modeling, "The consensus reaction to the pause, i.e. denial and excuses, confirms that climate modeling has become a classic "cargo cult" science.", while DH

equates scientists to catholic nuns, "Every climate scientist who chants "we must act NOW" or "we need to do something" like a nun saying the rosary, needs to understand that there is not much we can do."

Education and work experience were used to justify doubts regarding effects and mitigation of climate change, although Lukewarmers tended to lean more on education than work in their responses. Mike mentions his doctorate in physics and claims his degree should allow him to judge quality work in science,

Anyway, I have a Ph.D. in physics. Climate and atmospheric science are not my areas, but I know a reasonable amount about fluid flow and uncertainty and computer modeling. I think I know enough to be able to recognize a good argument when I see one, and that's what first bothered me about the climate doom and gloom. It seemed like a lot of hype, and darn little in the way of good arguments.

Some respondents used their education in non-directly related fields to sow doubt on the science. DP questions the data through the knowledge gained through his work in Art and Art History,

I come here with a MFA in ceramics and art history. I wrote my masters dissertation on the rise and fall of various western civilizations due to changes in the weather back in the mid 80's before climate change was on my event horizon. There were many books that described the weather conditions as well as paintings and drawings that depicted the conditions at the time.

Lukewarmers, again, used the same typologies of motivated reasoning, but did not use them to reject the consensus position, but only positions of mitigation and environmental effects. Their main focus was to use educational experience to justify their position. Political and economic reasoning was in line with the other groups and research, predominantly coming from a politically conservative and economic free market position. Religion was used to frame science and scientists as being part of a religious group in order to reject the science.

Skeptics

Skeptics were the most likely to justify their positions through background experience with 81 of the 98 responses mentioning education or work. Politics had 28 mentions, and economics and religion has 14 each. Skeptics tended to be more neutral in their use of political language, more often talking about the science being politicized and not putting a left/right position on it. Hugh sees the science as politicized and therefore, not to be trusted, "Since the climate science community has been unable to wash its dirty laundry, I believe it is fully politicized and should not enjoy the full trust from laymen." However, when politics were mentioned, there was a distinctive slant in framing climate change as a left wing issue,

Climate science was starting to be really pushed when I was in school (in the UK) about 25-15 years ago. It didn't seem to make sense then and was being promoted with a very left wing slant which made me suspicious. There is no reason for actions to mitigate climate change to be socialist rather than libertarian so why the partisan behaviour? -

Danny

Economic framing was used in the same way as Lukewarmers and Deniers through the lens of free market ideology with a focus on taxes and government spending. FR takes issue with the tax dollars being spent in mitigation, "I became interested years ago because it was in the news so much and because more and more tax dollars are being spent every year to prevent AGW", while PW is concerned about the money being spent to research global warming, "The most distressing thing is that the money spent on AGW research could have been used to address real problems such as access to clean water, sanitation and healthcare."

Skeptics most often used religion similar to Lukewarmers, framing the science as a cult of as a religion to be rejected. David explicitly equates science with religion, "In the words of today's Greek hero, "It's not science – it's religion with equations." There was also distinct overlap into other reasoning, with Rab using politics and religion together to justify his skepticism,

My biggest problem with the state of climatology is that it has become hideously politicized, the alarmists showing much of the self-rationalizing behaviour of cult followers. Am I really supposed to accept unquestioningly a cult's claim that the end is nigh?

Perhaps the surest sign of cult-like thinking is the insistence by many that their ultimate conclusions are incontrovertible.

There was however one major difference in how religion was used, two of the respondents used religion to frame their skepticism as agnosticism. Both Tnk and Don used the language of

religion to describe their positions on climate change, Tnk sees agnostic as a more appropriate descriptor than skeptical, "The main reason why I am skeptical (perhaps agnostic would be a better word)", and Don also states his skepticism in science as agnosticism "...nothing has changed, other than my original agnosticism about the science and scepticism [sic] about the politics have been strengthened."

Skeptics use of background was similar to the other groups, with about an even mix of education and work experience represented. Work experience was used to call the scientific basics into question, DG takes specific issue with computer models, "I was employed as a quantitative analyst and modeler for several decades. As such, I am all too familiar with the limitations and failings of models of complex, dynamic, non-linear systems." Using his educational background in meteorology and environmental engineering, Oz calls the same computer models into question,

I'm a meteorologist and environmental engineer with a long-time interest in all earth sciences and astronomy. I have a Bachelors Degree in Engineering Science (1974) and Masters Degree in Engineering (1979) from the University of Texas at Austin with a major in meteorology and minor in environmental health engineering. I have close to 40 years of work experience in air quality and weather forecasting, analysis, monitoring, quality assurance, and data validation.

I initially accepted the human-caused global warming propaganda up until 2008 when I decided to look into the science in more detail. I quickly found that the evidence was

shaky at best and largely dependent on speculative positive feedbacks and unvalidated [sic] models.

Skeptics, Lukewarmers, and Deniers all engage in the same motivated reasons for justifying their positions. It is only the positions they use the reasoning to justify and the frequency of usage that varies. Education and work experience was the most frequently mentioned for all groups while religion was the least frequently mentioned. Skeptics were the only group to use the idea of religion, in their case agnosticism, to analogize their position. The other groups used religion only to justify their positions.

There also existed much overlap into conspiracy, motivate reasoning seems to be needed as an extra push to make an alternative explanation a valid one. It is not enough to just say the scientists are wrong, but there needs to be a reason why they are wrong. Motivated reasoning provides context for the conspiracy by creating the reason why scientists would engage in such an act. The ideologies of economics, politics, and, religion, all play varying roles amongst the groups. Often these ideologies are then reinforced or are supported by previous experience in work and education.

Science Based Rejection

Bruno Latour's Actor Network Theory provides another perspective to examine science denial. Latour posits that the very nature by which scientific facts are constructed has created a counter argument based on that very position. By focusing on uncertainty in scientific knowledge, an alternative explanation to global warming has been created by focusing on uncertainty within climate science (Latour 2004).

These argument types are much like motivated reasoning in which they do not stand on their own as explanations, but instead act as cognitive "motivations" that somehow the science is fraudulent and not to be trusted. This can be through questioning scientific methods, data collection and measurement, publishing standards and peer-review. The most simple, but common example of this is the focus on use of computer modeling in climate science. Models are seen as too uncertain or not refined enough to be used to make determinations and therefore the entire field is considered suspect. While these conclusions may be logical leaps or misuse of science or scientific concepts, this research doesn't aim to debunk these myths, but only to understand and document their use in the rejection of climate change. Both Deniers and Skeptics had 50% of their responses mention some form of scientific uncertainty in their responses, while only 37% of Lukewarmers mentioned some form of uncertainty.

Table 5 - Science Based Rejection by Position

Position	Count	Key Concepts
Denier	24 (50%)	Methods in temperature reconstruction, computer models, uncertainty
Lukewarmer	10 (37%)	Computer models, complexity, uncertainty
Skeptic	47 (50%)	Uncertainty, temperature records, computer models

Deniers

24 of the 48 denier responses had some basis in the uncertainty of the science or taking issue with how the knowledge of the science was constructed. Deniers used this as solid proof that the scientific consensus was not real. Deniers focused on a variety of explanations to counter the consensus idea of global warming. Gus questioned the methods used in temperature reconstructions, "Splicing tree rings with temperature records, censoring the tree ring data to 'hide the decline', using dodgy short centering statistics ...totally unscientific."

Some posed that because scientists do not fully understand one aspect of science, that they cannot understand this aspect of science. Otter focused on an argument that because scientists do not fully understand the teleconnection between certain weather events, that climate science should be questioned, "So the thought came to me: HOW could they be blaming humans for global warming, if they don't even know how El-nino events and hurricanes interact?"

However, the main focus of science based rejection was on uncertainty in data measurements. Ang referenced the margin of error in temperature measurements, and the chaotic nature of weather, "Having looked into the science, I think that too much of the statistics is questionable and the temp time series must have large error margins of around a degree centigrade. And the climate is chaotic, deterministic but unpredictable."

Rui used another aspect of this uncertainty argument by questioning the computer models. He makes the comparison between the stock market and climate models, suggesting that models cannot be accurate in climate science because of the unpredictability of the stock market,

If computer models are so good why isn't there a single stock market successful model? Why aren't clinical computer models as good as actual trials? I believe that is so because our understanding of reality is limited, and overlooking our ignorance when analysing data is not serious, claims of 95% certainty for future events are seen by me as acts of egomania, a personality flaw."

These arguments all focus around a scientific based mistake or misstep. That somehow the methods, the data, or the science itself is all questionable which it turn makes the entire idea of human caused global warming untrue. Deniers focus their arguments in the temperature data and model data which brings into question the very evidence of past warming, current warming, and future warming.

Lukewarmers

10 of the 27 Lukewarmers used a science based argument to explain their skepticism to certain aspect of climate science. Like previous instances of rejection, Lukewarmers did not reject the basic idea that CO2 causes warming, but instead rejected other ideas with the field. The main focus of Lukewarmers was the computer models. FTW uses his experience in modeling to question computer models, stating that more complex models create larger errors,

This meant a lot, and I mean a lot, more statistics than most biologists have and probably more than a lot of scientists in general. One of the cardinal rules of epidemiology is the danger of statistical extrapolation. No matter what you think might happen, there are always unknown factors that change your results or unexpected inputs you never thought of in your model so any kind of extrapolation almost always fails. Computers allow us to do more complex extrapolations and therefore make even bigger errors.

Continuing on this notion, FM claims models cannot be trusted unless confirmed. This position fits into the Lukewarmer typology by requiring a lack of any mitigation action until the models are confirmed to be accurate.

I have seen first-hand the results of placing too much confidence in models. As an experimentalist, the only authority I completely trust is Nature herself. Until a model has been very exhaustively confirmed, it should be treated with an enormous amount of skepticism.

A secondary focus was on the large complexity in the field of climate science making it impossible to really know what was happening. GW thinks there are too many variables to examine and that science may never be able to answer questions regarding climate change with any accuracy,

Based on my current knowledge, I'm in the "CO2 may have a minimal impact, but is not a primary driver" camp. At this point I think the solar influence "may" be the/a "primary" driver. And by that I mean fluctuating energy from the sun, inclination of the earth, etc. However, I believe this "science" is in it's infancy and that there is a LOT out there to discover and add to the mix.

I'm also in the camp that thinks the global climate is an extremely complex and dynamic system that will take a "very" long time to figure out. Based on the history of humanity, it may actually NEVER be figured out by the current civilization.

Lukewarmers push the idea that science is too complex to fully understand, and that models cannot be trusted to aid in understanding future climate change. These concepts fit well with the Lukewarmer position, focusing their ideas of uncertainty on to aspects of science related to outcomes and mitigation of climate change.

Skeptics

47 of the 98 Skeptic responses contained science based rejection of the consensus. Like the other categories, Skeptics questioned the scientific consensus by using uncertainty in science

as a basis for their skepticism. Computer models were the most popular science based rejection, echoing the same ideas as the Lukewarmers and Deniers.

For me, climate skepticism is part of an intellectual journey that began about a decade ago when I started trying to replicate results in the CFD literature and carefully compare methods and codes. This has turned into a much larger effort with many collaborators and some interesting publications and still has a long ways to go to complete. We have found that much of the literature is unreliable and that the numerical methods used in virtually all the simulation software is not adequate to resolve or estimate the true uncertainty. This is an important project economically as people try to use simulations not just to design products but to certify them, where the level of public scrutiny is much higher. This is directly related to GCM's and their heavy use in climate science. - DY

Skeptics also focused on uncertainty in the temperature records. DG questions the reliability of temperature records in part due to his work with databases, "As one familiar with the compilation of large databases over extended periods of time, I have serious doubts about the accuracy and reliability of the global historic temperature records." Jim combines the ideas of models and temperature records to frame his skepticism, "I don't believe that climate models are useful for predicting climate. I'm still skeptical of the accuracy of the land temperature records, but don't believe anyone is purposefully skewing the data to warm. Also, I don't believe attribution has been nailed down. All in all, there are still a lot of unknowns."

There was also a focus seen previously with the Lukewarmers on uncertainty being framed as not knowing everything in a field must mean scientists cannot know anything. HZ claims we need to understand natural variation before we can make any projection, "Until we understand natural variations in clouds, precipitation, oceans, the sun, ocean/atmosphere interface, the Arctic atmospheric dynamics, and all feedbacks +/- enough to quantify them, projections are meaningless."

The statements in all three groups focus around uncertainty in measurement, in data, in computer models. All of this uncertainty is often used to argue that because we do not know something exactly, we cannot know anything at all, or in the case of Lukewarmers, that we should take no action. Latour argues that this is the exact opposite of what his theory regarding the social construction of scientific knowledge was trying to get at, that his goal was to bring us closer to empiricism and not farther away (Latour 2004). In this sense, Deniers, Lukewarmers, and Skeptics all engage in using this to poke holes in science, and as justification for their conspiracy theories and alternative explanations, to move away from science as a valid explanation. Latour provides a theoretical background for the root cause of why people reject scientific evidence, however, it is the actual conspiracy ideation and motivated reasoning that provides a mechanism for how people reject climate change as notions of uncertainty are almost always intertwined in other conspiracies or motivated reasoning.

CHAPTER FIVE: CONCLUSION

Discussion

This study set out to explore how individuals position themselves in the climate change debate and examine the reasons for such a large difference in the scientific consensus that carbon dioxide from humans burning fossil fuels was responsible for the current increase in average global temperature. Using the previous research to help frame the research, the current study specifically aimed to expand the understanding of the influences of conspiracy theory, motivated reasoning, media choice, and the construction of scientific knowledge in the rejection of climate change each play in constructing and evaluating beliefs. In addition, the study was able to provide a better understanding of the ways in which public respondents construct their positions in the climate change discourse and descriptions of their stated positions.

The primary empirical findings reveal that positioning in the public debate over global warming is more complex than a simple binary of acceptance / rejection of scientific findings. Respondents' descriptions analytically fall into four separate categories based on their stated beliefs towards a human cause of global warming and, for Accepters, belief towards policy, mitigation, and outcomes of climate change. The findings also show that to some degree within the groups of Deniers, Skeptics, and Lukewarmers that question the consensus on climate change, each group uses media, conspiracy ideation, motivated reasoning, and forms of distorting the social construction of scientific knowledge to evaluate and put forth their opinions on the topic. Within motivated reasoning, two new categories of religion and educational and

work experience were found to play a role alongside previously researched topics of political ideology and economic ideology. As a whole, some respondents showed combination of reasonings in the statement of their opinions, suggesting a more complex interaction between reasonings to present their rejection of the consensus standpoint.

It can be argued that Accepters and Lukewarmers both, to a certain extent, accept the basic ideas of the consensus and alternatively Skeptics and Deniers reject the basic ideas of the consensus, helping to explain the acceptance / rejection binary found in past research. However, this research argues the positions are analytically distinct due to nuances through which respondents in each group situate themselves in the finer points of the debate. Accepters and Lukewarmers differ to the greatest extent according to how they explain policy, outcomes, and mitigation with Accepters leaving room for debate over the issues, while Lukewarmers can be differentiated according to their skepticism surrounding the need for mitigation or that the stated outcomes will be negative. Skeptics and Deniers both reject that anthropogenic CO₂ is the main driver of current warming, but differ by how cemented they project their position. Deniers give a rather distinct impression that their rejection of the science is immovable, while skeptics claim to be open to the possibility they are wrong. These positions are also identifiable within the usage of media, conspiracy ideation, motivated reasoning, and science based rejection by the separate groups. The distinction of these four analytic categories provides much needed nuance in how individuals position themselves in the climate change debate. Guided by the explicit and implicit definitions and descriptions of the individuals, these four categories serve to better define science rejection as having multiple positions beyond simple accepting and rejecting, and that these

positions come with their own understandings and usage of different justifications in accepting and rejecting science.

Media choice was found to create or reinforce Denier and Skeptical positions through exposure to only contrarian information. Lukewarmers, however, consumed both contrarian and main stream sources of online information on climate change, which also can be seen as fitting their position of acceptance of the basic science, but rejection of varying other aspects of related scientific projections. This is in line with prior research on print and television media that supports the influence media choice as affecting opinion formation in the public climate change debate. For some, media choice predated their opinion formation, while for others, media choice reinforced their held positions. Informational sources in the online setting seem especially vital due to their ease of access and interconnectedness, with most contrarian sources coming from the top ten most centralized "skeptical" websites. Media choice was also found to be interrelated to some forms of motivated reasoning such as politics, suggesting that for some, choice in media is also mediated by motivated reasoning.

Conspiracy ideation was a main reason for rejection, with a particular focus on Climategate. Although there was no stated wrong doing by any of the scientists involved in Climategate, respondents' posts put forth this issue as a major lynchpin in determining their opinions on climate change. It appears to provide a real world justification for the conspiracy alternate explanation that scientists are colluding with each other to falsify or manipulate data and results. Accordingly, like any good conspiracy theory, the evidence that debunks it cannot be accepted as it is part of the conspiracy. Previous research by Lewandowsky (2013) suggests that

conspiracy ideation of any kind is a hallmark of science rejection and according to this analysis, it is, but it requires other motivations for it to be accepted, as often the conspiracy theory itself was intertwined with other categories of rejection.

Political and Economic ideology were important for all groups and were often found connected to other predictors of rejection, like conspiracy theory. Most respondents took free market, right wing approaches in justifying rejection, therefore supporting previous research into political and economic ideology.

Educational and work experience was discovered to be a large factor in opinion construction and evaluation through motivated reasoning. Comparisons between a respondents previous work and schooling, in a related field or not, had major influence to how they viewed particular aspects of the science behind climate change. Deniers, Skeptics, and Lukewarmers used this experiential background to reject scientific assertions and positions through biased notions that related to specific issues of scientific knowledge when compared to their experiences. Regardless of correctness in argument, this bias led many to believe the work being done in climate science was faulty or fraudulent, which they then gave justification for rejection of the consensus position or, in the case of the Lukewarmers, some other aspect of the science.

To a smaller degree, religion was found to be a contributing factor in motivated reasoning. Some respondents used religion to refer to the science and scientists as cults, zealots, or being a part of a religious movement which was then used as a basis for rejection, however, one respondent used religion as justification as to why global warming could not be possible.

Interestingly, only Skeptics used the idea of religion to relate to their own beliefs, referring to themselves as being agnostic about the science. While not a frequent mention, the use of religion and the different frames in how religion was used provided a new insight into a link between religious belief and climate change.

Many arguments questioning the science revolved around how scientific knowledge is socially constructed. This occurred through respondents questioning the data, models, and scientists involved through focusing on the uncertainty that exists. This theoretical background provided by Latour (1979) is the reason why people reject science, while motivated reasoning and conspiracy ideation is how people reject science.

For a great number of respondents, more than one justification was found to be used to explain their position. Media choice, conspiracy theory, motivated reasoning, or distortion of the social construction of science was not sufficient on their own to justify rejection. Instead, interplay of two or more of these positions were often utilized to create a more complex justification. This interaction suggests that in order to maintain cognitive consonance a complex set of cognitive biases must be utilized to maintain a position of rejection. In other words, in order to reject the overwhelming evidence of anthropogenic global warming, and the consensus, an increasingly complex alternative explanation must be created, with the specific variations in the alternative explanations conforming to the specific reasoning that appeals to the individual.

Limitations

This study used computer-mediated communication collected via an online blog to analyze how people position themselves in the climate change debate, and what justifications they use for climate change rejection. This approach creates a number of limitations which must be considered. First, the community may not be a representative sample. Previous research on investigating climate change denial through use of blog surveys has noted the issues with non representative samples (Lewandowsky et al. 2013b). The same concerns can be applied here even with the differences in quantitative and qualitative methodology. However, the focus of this study was to examine how people situate themselves and their justifications for rejection of climate science, therefore the analysis of the ideas themselves do not necessarily require a nationally representative sample to examine rejection of climate science.

Second, the ideas expressed by the community may be influenced by other responses within the community and due to the online nature of the data, some respondents may simply be lying. Adopting a social constructionist perspective allows us to understand the respondents are constructing their opinions through their posts and are therefore constructing a desired presentation of their positions; thus, “lying” would still be a component of situating themselves within the climate change debate. The possibility that some of these posts are lies and not truly self representative is plausible, however, the high number of contrarian viewpoints expressed suggests any of these posts that made it through the analysis would not have an appreciable effect on the outcomes. Therefore, based on the interactions that occur even through computer-mediated responses, respondents may very well imitate others to fit into the community. Later

responses may not be independent evaluations of an individual's reasoning; however, that does not mean the data an analysis are of no use, but rather that the frequency of certain justifications may be actively constructed to fit within a category of positioning.

Future Research

With the findings showing such a strong relationship between education and work experience as justification for rejection of climate change, more research needs to be done to look past previous measures of educational achievement and industry type to more fully examine how the specific type of work and educational training plays into belief construction on science related topics. A starting point to breach this alternative way to examine education would be to ask what type of degree was obtained alongside educational achievement in national surveys. Another approach would be to ask what industry the respondent is currently employed in, or for the retired, what industry they spent their careers employed in. These questions may help to begin to provide a much needed educational / work experience context for science denial and in turn, and thus may provide a key to understanding how to deconstruct deeply held anti-science positions acquired through school and work.

Conclusion

The aim of this study was to better understand the reasons for the large discrepancy between the scientists and the public through the established understanding of what has been shown to lead people to rejecting climate change. The research was able to provide an understanding of how people position themselves in the climate change debate, new supporting

evidence for the role of media choice in online settings as it related to climate change opinion formation, two new factors, educational experience and religion, by which people use as motivated reasoning to reject climate science, and explored the interaction of the previously studied categories, suggesting that simple alternative explanations may not be sufficient in explaining how individuals come to science denial as a valid option.

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