Media Misinformation and Media Literacy: How it Affects Climate Science Belief and Validity

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Abstract

The purpose of this study is to analyze and evaluate the persisting spread of misinformation throughout our various media sources in order to assess how this affects the publics belief and perception in regard to climate change validity. This information is crucial to finding what ways this spread perpetuates myths and disbelief regarding climate science. With these findings I will also be exploring how the lack of media and information literacy plays a major role in this disbelief. The population I will be focusing on within the study is the people of the United States of America. I will be conducting this study through a qualitative researching process, starting first with a deep analysis of literature from reputable sources. With this analyzed literature, I will then organize it into a comprehensive literature review broken down into subheadings. Multiple surveys and studies were performed throughout the literature. Looking closely at the way climate misinformation is spread within our media, and how we assess and interpret said media is extremely important considering how it affects trust, belief and perceived validity in climate science.

Chapter 1: Introduction

The spread of misinformation within the media, particularly regarding climate change, is a pressing and imperative problem across the globe. It creates immense communication, knowledge and public health barriers between experts, scientists, and the general public. In an era where media consumes almost every aspect of our lives, it is crucial that we collectively learn how to properly assess and analyze the influx of media messages that we are presented with on a daily basis; especially in the face of climate change misinformation. In other words, in order to truly combat misinformation, false news, and the effects it has on climate science belief and validity, proper information literacy must be in place throughout our society.

Throughout my analysis and investigation of existing academic literature, it has become quite apparent that proper information literacy requires educating people in critical thinking, reasoning, and analyzation skills that teach individuals to question, asses, and evaluate the media they are exposed to. Currently, there are college level classes that primarily focus on media literacy that are beginning to scrape the surface on these important conversations. While distinct systems and or mechanisms aimed to teach information literacy are not currently active in all education levels, the discussion of programs, educational techniques, and implementations in school curriculums are gradually circulating within the professional and scientific worlds.

Apart from education in school settings, systems like the "Inoculation Process," is also within academic discussions geared towards combating misinformation. Other systems like technological solutions, algorithms aimed to detect malicious intent, psychological corrective approaches and legal regulations are all extremely important elements to the discussion of misinformation and media literacy education. Given these skills, mechanisms and educational approaches one has the ability to individually decipher between contrasting ideas, question and reflect on these ideas and make impactful decisions that contribute to the betterment of our society. Our society, flooded with its various media messages from endless sources, is contaminated with false information from all directions. It is not only a threat to the knowledge and communication of important and factual information, but to our public health and safety. Media misinformation has an especially negative and detrimental effect on the belief and validity of climate change science. Climate change misinformation must be combatted through proper media literacy education that highlights and cultivates critical thinking, reasoning skills and everything in between. Research must be continued to facilitate the growth of these fields of study.

Misinformation is false or inaccurate information that has a specific goal to deceive the public, whether it is through TV news, newspapers, or online media. In late 2016, Oxford Dictionaries selected “post-truth” as the word of the year, defining it as “relating to or denoting circumstances in which objective facts are less influential in shaping public opinion than appeals to emotion and personal belief (Pew Research Center, 2017).” Misinformation makes way for self-interest driven people, companies and organizations to perpetuate myths about important issues. A prime example of misinformation perpetuating disbelief would be within the issue of climate change.

Climate change is defined as the disruption of natural weather patterns and temperatures due to human activities, such as the continuous burning of fossil fuels like coal and oil which release harmful chemicals like carbon dioxide into our atmosphere. In our modern society, climate science has been overshadowed, undermined, and put into question numerously by front groups, paid philanthropic actors and private organizations that are funded by massive corporate industries. As this misinformation continues to be spread throughout our various media outlets, it creates a ripple effect of perpetuated false climate science which affects its perceived validity. As a result of this spread of misinformation within the media, we are left with a mass public overflowing with doubt, confusion, and disbelief. The purpose of this research is to investigate what ways the spread of false information by the media perpetuates myths and disbelief regarding climate change. As well as how the lack of information literacy in the US plays a role in this disbelief. With this information we can combat these myths and provide people with mental tools and resources that allow them to independently decipher and strategically think when it comes to information in the media.

Given these mental tools and strategies, we can build a media literate society that is capable of not only forming their own educated opinions but also to strategically think and decipherer between true and false information so that one is not fooled by the multitudes of false information within the media. With different tools and strategies implemented throughout various educational outlets, individuals have the ability to gain strong reasoning skills.throughout life. Given these abilities, there is strong potential for our future to hold a society of media literate individuals who can strategically think, decipher, analyze and accurately interpret media misinformation they are exposed to, specifically in regards to climate science misinformation and the myths that circulate it. Being able to deduce false media messages in a "post-truth" society, is extremely important in combating perpetuated myths and disbeliefs regarding climate change.

Background

How Climate Change Has Happened

Since the beginning of our species, we have taken and utilized the elements and materials we have here on earth. Whether that be for warmth, shelter, sustenance or protection what we use and how we use it has an immense impact on our environment. As humans have evolved, we have prospered in many ways. We have learned how to domesticate crops and livestock, create irrigation systems and from that have developed complex societies. As we have advanced in these aspects, our populations have grown because of the ability to continuously sustain ourselves and as time has progressed our abilities have only grown. As history has continued, the coinciding of human advancement and immense population growth has led us to a modern society of over consumption of earth's elements and natural materials.

As a result of our over consumption and over production, we have made extensive negative impacts on our environments. Due to our actions, we have altered the climate of our entire planet which has already shown disastrous effects. Climate change is defined as the disruption of natural weather patterns and temperatures due to human activities, such as the continuous burning of fossil fuel like coal, oil and gas which release harmful chemicals like carbon dioxide into our atmosphere. Dating back to the early 1800s, we see experiments done that suggest human activity has the capability to change our climate. Throughout the 1950's we come to find that our CO2 and other hazardous emissions are indeed effecting our climate and even causing what would come to be called the global warming theory. We emit these harmful chemicals through generating electricity of any kind, manufacturing goods like steel, cement, iron, electronics, plastics, clothing, etc, cutting down our forests, using transportation such as cars, ships and planes, producing our food, and our daily lifestyles.

As a result of our massive over production, continuous burning of fossil fuels and the emissions that come from said burning (carbon, methane and hydrocarbons) we are confronted with drastic change in earth's natural weather patterns as well as a colossal heating within our atmosphere. The effects of our actions have already been in effect and will continue to worsen if we carry-on with our present practices. Temperatures within the last decade have been the warmest on record, with Arctic temperatures rises twice as fast as the global average. Around the world we see destructive storms getting stronger and more frequent, we see increased drought in places that already struggle with water shortage, a warming of the sea and rising of its levels, we see loss of species and global food shortages.

These effects are our reality, we live with them everyday. They are embedded in proven facts from scientist and experts around the world yet there is an unprecedented amount of people who completely disbelieve and or deny this climate science. As stated by Van der Linden et al, (2015) “at least 97% of climate scientists have concluded that human-caused climate change is happening”. Deniers make it a priority to mislead and misinform the mass public regarding climate science. They use multiple media outlets to spread false and or misinformation, which in turn perpetuates myths and disbelief regarding climate change. Through a multitude of missed opportunities to reverse what has been done, we are now confronted with the issue of climate science misinformation within the media.

Chapter 2: Literature Review

Throughout the process of my research, finding scholarly publications on misinformation and climate change as one idea was somewhat of a process in the beginning stages of my exploration. When I first began my research, I was inclined to approach the issue of climate change within a more scientific context, though I quickly came to realize that would involve extensively analyzing scientific data that I am not familiar with. Nevertheless, I was still drawn to the topic of climate change, trying to determine what angle I could come from that was still in the realm of bringing awareness to the issue. This is when I made the decision to shift my frame of interest to a more sociological and psychological context on the issue of climate change. I couldn't stop asking myself why, with such an abundance of scientific evidence and data that we have, could there be such a mass disbelief in climate science. After considerable deliberation, I arrived at a concluding thought. I was struck by the reality that a great deal of our climate change issue can be directly linked to a cohesive, societal lack of media and information literacy.

This study allowed me to dig deeper into how our societies immense lack of media/ information literacy plays a leading role in the societies mass disbelief and invalidity in climate science. With our modern societies massive influx of false and or misinformation throughout the media, it its pertinent that the public becomes properly educated in media and information literacy. After pinpointing a specific area of study, I began scrolling through various article headings for any indications of climate change intertwined in media literacy. Searching for information, fact finding and data collection all went into my researching process. There wasn't much of a disagreement within my initial search results or my chosen sources. Once I was able to identify my topics specific direction, It was surprising how many sources came up on said subject matter. Many of the articles findings were fairly similar to one another. The main focus within each study was approached with the over arching disciplines of psychology, sociology, and climate science. While each articles' approach differed slightly, most of my chosen sources kept their primary focus within the perimeters of the spread of false information by the media and how it perpetuates myths and disbeliefs in climate science.

Kathie Treen is currently a final year PhD student at University of Exeter, UK. The topic of her PhD is on online misinformation and climate change. She has published two scholarly articles, including this one and is the recipient of a Hutton Prize for Excellence as a result of her MBA dissertation. This article published by (Treen et al. 2020) titled "Online Misinformation about Climate Change" first presents its readers with broader questions pertaining to climate change and its misinformation that is consistently generated throughout our media. Leading with significant questions such as: how does it spread? why does it matter? and most importantly, what existing strategies are there to counteract it? This article is an organized overview that aims to answer these fundamental questions with the help of existing literature pertaining to the concepts of misinformation and disinformation. Another aim of this article is to properly discuss the relation between online information and climate change. Treen et al explains that the spread of misinformation is a vicious cycle, acting as a "contagion" that rapidly spreads misinformation from one person to the next. To break down this cycle, the authors use the epidemic (or contagion) model to explain how misinformation spreads.

I believe the "contagion" was a successful approach to explain how climate change misinformation is diffused throughout our various media outlets. It allows the reader to view the diffusion as a whole process with each step contingent on the first. While presenting its readers with a clear definition of misinformation in connection with information and disinformation. The authors of this article suggest to its reader a theory that climate change debate on social media is" highly susceptible to the diffusion of misinformation". As well as proposing the idea that social media users with particular ideologies and belief systems are often the ones most susceptible to perpetuating climate change misinformation. Taking from preexisting literature, Treen et al. discusses the various methods and tools individuals can use to counteract misinformation within media and literature. For example proper education and inoculation therapy.

Gordon Pennycook is an Associate Professor of Behavioral Science at University of Regina's Hill/Levene Schools of Business. July of this year he will be moving to Cornell University to be apart of the Psychology Department. Pennycook received a Bachalor of Arts degree from the University of Saskatchewan, Canada in 2009. A year later, he received his Master of Arts Degree and in 2016 received his PhD, both from the University of Waterloo, Canada. His research interests include reasoning and decision making as well as the causes and consequences of analytic thinking. Pennycook has published numerous academic works as well as being a contributing author for other scholars works. Within the article titled, "The Psychology of Fake News", we are presented with a psychological analyses that synthesizes literature and investigates why people believe in as well as share, false or highly misleading news online.

Authors Pennycook and Rand, focus on an essential question regarding the psychology behind human behavior and our interactions amidst social media. They aim to examine what it is about human psychology that explains our societies ineptitude to properly distinguish between accurate and inaccurate media content. Throughout this analysis, the authors focus mainly on online content that is in the form of a news article, as well as focusing on "individual examples of misinformation". According to Pennycook et al. (2021) political polarization and partisanship aren't the reasons why people may fall for false headlines or media messages as previously believed. Through social experimentation and traditional lab tests, the authors of the article have synthesized research stating that people believe and or fall for fake news due to poor truth discernment, which is linked to a lack of careful reasoning and relevant knowledge within a specific subject. This is contrary to a common belief of its connection to political concordance. One cannot obtain sharp perceptions or judge information properly when there is an inability to reason and think analytically. People often fail to discern truth from fiction within the media for the reason that they do not stop and think about the accuracy of what they are reading or seeing.

The article provides its readers with numerous charts to represent the studies they conducted as well as their findings. For example, figure 1. on pg.390 displays two scatter plot graphs with data from 14 different studies. Graph (A) is used to represent "the difference in truth discernment between participants who scored higher on the Cognitive Reflection Test relative to those who scored lower." Graph (B) represents the difference in the average of belief between true or false information within the media. This average derives from participants high or low score on the Cognitive Reflection Test. The authors of this article leave its readers with the theory that failing to differentiate between false and true news is a symptom of poor truth discernment, paired with failing to stop and reflect on the accuracy of the media source or it's findings. Through a synthesis of literature, the authors of this article provide new approaches to battle the issue of fake news. These approaches include, psychological interventions such as 'inoculation', 'pre-bunking', information that helps individuals identify misinformation, and fact-checking techniques. Throughout this analysis, synthesis of literature and investigation of human behavior within the media, we are lead to the concluding idea that asking the essential question "what is it about human psychology and it's interactions with social media that explains the failure to distinguish between accurate and inaccurate content?", will lead to developing effective interventions against misinformation.

Caren B. Cooper, the author of the article titled "Media Literacy as a Key Strategy

Toward Improving Public Acceptance of Climate Change Science" is an Associates professor of Forestry and Environmental Resources at North Carolina State University. In 1988 Cooper received a Bachelor of Science degree in zoology and in 1993 she received her Masters degree in zoology as well as physiology, from the University of Wyoming. Eight years later in 2000, Cooper received her PhD from Virginia Tech. Her research interests include geospatial analytics and ecosystem services of trees that help the public to better understand urban forests. With this being said the author of this article is a reliable source.

The topic and or thesis questions of this article is the use of media literacy as a key strategy towards improving public acceptance of climate change. Cooper greatly acknowledges the role that media literacy plays in climate change acceptance and validity. She recognizes and brings to light the lack of U.S policies in place to address climate change, while also stressing the importance of "climate literacy" in order for a public acceptance and trust of climate change science. According to (Cooper 2011) "Science education and educators must make a shift to more effective learning strategies that enable trust, emphasize empowerment through reasoning skills, and embrace the maturing discipline of media literacy education." The author presents the question, why is there a lack of political action being taken in regard to climate change policies? (Cooper 2011) states that the answer to this question can be found in our societies current approaches to climate education. For example, ISE or (traditional informal science education) which is science taught outside of the classroom "does not emphasize critical thinking or address the major gap between policy action and climate science (Cooper 2011)."

There must be a shift towards more effective educational approaches that enable trust, provide mental tools for individuals to properly reason, and allow people to embrace the methods used for media literacy education. Public trust in climate change science is pertinent for the serious climate threats that we face to be addressed by our policymakers. Within this review article, the author synthesizes literature and analyzes the cause and effect relationship between public acceptance of climate science, and media literacy as a key strategy to improve this acceptance. Data from numerous reliable scholarly authors is provided as well as a gradual method divided into three “phases” that summarize key questions that can be used in informal science education experiences. The author leaves us with a few concluding thoughts; suggesting a new strategy to improve public acceptance of climate change science that includes multi disciplinary components. The strategies can include making space for more conversation and dialogue surrounding these topics as well as providing tools for critical thinking and reasoning skills that help people properly analyze the media they see. The public must be provided with critical thinking and media literacy skills in order to combat the endless flood of misleading or confusing information within the media.

Stephan Lewandowsky is an Australian psychologist currently based at the University of Bristol, England where he has stayed since 2013. He is the Chair of Cognitive Psychology at the School of Psychological Science. Lewandowsky received a bachelor's degree in 1980 from Washington College, Maryland. A year later he received his M.A.and a Ph.D. both of which were from the University of Toronto. He is also the recipient of the Royal Society Wolfson Research Merit Award. Lewandowsky’s main research interests fall under the category of psychological science, for example he asks the question “ how do people update memories if things they believe are no longer true?”

The main thesis of the article titled "Climate Change Disinformation and How to Combat It,” surrounds the issue of climate change disinformation throughout the media and provides tools to combat it. The author analyzes and reviews existing literature pertaining to communicating climate change, as well as dispelling the misinformation surrounding it. He identifies the challenges that climate change science poses on peoples cognitive abilities and world views. Any type of climate mitigation will undoubtedly come with economic and political implications that do not align with the current capitalist free market society we live in. This has lead to an environment both on and offline, that continuously perpetuates disinformation. Throughout existing literature on these topics, several conclusions have already been reached, which the author provides. Each concerning raising the publics acceptance of climate change science through methods such as providing more information on climate change and highlighting the scientific consensus. Lewandowsky (2021) comes to the conclusion that in order to take down the beast of climate misinformation before it is even encountered, processes such as psychological inoculation or debunking techniques must be implicated into educational institutions as well as introduced to the general public.

The article titled “Limited Effects of Exposure to Fake News About Climate Change” by Caitlin Drummond is a research article that attempts to study the effects that exposure to fake news about climate change has on individuals beliefs and decision. Drummond is an Assistant Professor of Decision Science in the School of Human Evolution and Social Change. She received her BA in Economics and English from the University of Pennsylvania in 2012. In 2017 Drummond went on to receive her PhD in Social and Decision Sciences from Carnegie Mellon University. She has written and or contributed to over ten scholarly works, which includes the article “Limited Effects of Exposure to Fake News About Climate Change”.

The authors state within the article “fake news mimics credible reporting formats but doesn’t mimic the content or intent or real news reports (Drummond et al 2020).” This statement brings to light the immense threat fake news sources pose on our public health as well as our countries democratic principles. Within this article, the authors conduct a preregistered experiment that asks how individuals’ expressed belief in climate change is altered or skewed by by exposure to fake climate news and the doubt that is casts on existing climate science. The experiment conducted for this study contained four different experimental conditions and each participant was randomly assigned to one group. After a series of questions concerning climate change belief, consensus and trust in scientists, the results found “little effect of exposure to fake climate news”. There were acknowledged errors within the study, i.e a limited ability to observe potential effects of exposure to fake news, due to the “wording of dependent measures.” While the direct results of this study weren’t aligned with my thesis, the authors did arrive at the conclusion that what has truly shown promise of limiting the spread of fake news is interventions that promote and facilitate critical thinking.

Van der Linden et al (2015) begins their article by identifying the current and widespread issue of the publics general “misunderstanding about the degree of scientific consensus on human-caused climate change.” As well as identifying how powerful “scientific dissent” can be at undermining the publics belief and support of climate change. Van der Linden is a social psychologist of Dutch nationality. In 2014, he was the recipient of a PhD from the London School of Economics and Politics. Currently, Van der Linden is working as a professor of Social Psychology at the University of Cambridge, his specific fields of interest lie not just in social psychology but behavioral science and decision making as well. He is well known for his “Gateway Belief model” (GBM) that is introduced in the article titled "The Scientific Consensus on Climate Change as a Gateway Belief: Experimental Evidence.”

Within said article, the authors introduce and build on prior research done that identifies the associations made between public perceptions of the scientific consensus, belief in climate change and the publics support of climate policies. This article continues this line of research by providing and advancing experimental evidence for the connections between the aforementioned elements. The study executed within this article was approved by the Yale Institutional Review

Board for ethical research. Within the research, the Gateway Belief model is used to provide the solid evidence needed to causally link perception of scientific consensus, belief in climate change and support for public action. The authors constructed "consensus-message experiments" with the participants answering questions based perception, belief and opinions on public action. The main goal within this article is to link public perception of climate change to the overall belief of climate change validity. With this data, van der Linden reaches the conclusion that in order to truly influence the publics response to climate change in a powerful and successful manner it is pertinent that we raise the publics perception of the scientific consensus. This perception being the "gateway belief" for future responses and public action to take place.

In the research article titled "Neutralizing misinformation through inoculation: Exposing misleading argumentation techniques reduces their influence", the authors conduct a study that explores the negative impacts brought on by the spread of climate change misinformation, as well as what can be done to neutralize its influences. Cook et al 2017 explains that in order for climate science to truly be heard by the minds of a skeptical public, we must go beyond the affirmation from scientific consensus to properly combat scientific misinformation and skepticism.

This is where mechanisms like the "inoculating" process comes into play, which is simply the process of one being "inoculated" against misinformation. This can be achieved through the process of exposure to a refuted version of a media message before ever seeing said media message. This specifically can provide the public with tools to identify misinformation as well as providing them with a supply of "counter arguments" (Farrell et al, 2019) to combat the misinformation on an individual level. The findings of the research conclude that inoculation intervention is strongly effective in neutralizing the negative effects that misinformation has on our society. Moreover, (Cook et al 2017) shares that the leading purposes of the two experiments conducted in their study was to promote and “stimulate critical thinking through the explanation of argumentative techniques,” as well as presenting a deeper, more strategic way of thinking about the information one encounters within the media. The author of this article, John Cook, is currently a Senior Research Fellow at the Melbourne Center of Behavior Change. He has his PhD in Cognitive Science from the University of Western Australia, which he received in 2016. Cook is also the recipient of an Australian Museum Eureka Prize, which he received in 2011 for his contribution to the advancement of climate change knowledge.

Within the article titled “Evidence-based strategies to combat scientific misinformation”, Farrell et al 2019 reviews existing literature regarding the spread of science misinformation and its impact on the prosperity and growth of our society.“Scientific misinformation undermines public understanding of science, erodes basic trust in research findings and stalls evidenced-based policymaking (Farrell et al 2019).” This article presents its readers with not only an analysis of existing literature, but an explanation to why there has been such a lack of effective responses or proper attention to the spread of scientific misinformation. The main reason being, experts have overlooked “the underlying institutional structure, organizational power, and financial roots of misinformation (Farrell et al 2019).”

In a comprehensive and organized discussion, the authors present four key evidence based strategies derived from recent advancements in social science research, created to support and provide the public with the tools necessary to counteract and obstruct the massive influx of media misinformation before it has a chance to plant itself in the minds of the people. In their concluding statements, Farrell et al makes clear that any responses to the spread of misinformation in all of its forms, must include the aforementioned strategies in such a way that the misinformation is expelled before or concurrently with its production and expansion. As well as include the acknowledgment of the inner institutional and political structures that are intertwined with the spread of misinformation. “The strategies presented here do not exist in a vacuum from one another, and must be better coordinated if they are to be effective (Farrell et al 2019).” They are hopeful that these strategies will be successful and contribute to our societies prosperity and growth. The author Justin Farrell, earned his PhDd in Sociology at the University of Notre Dame in 2014. He is currently a professor of Sociology in the School of Environment at Yale University and is the author of numerous academic articles that speak on both climate change and the spread of media misinformation.

In the article titled “Environmental Conflicts and Public Interest Science” Shiva et al 1986, puts forth two central ideas. The first central idea being science reductionism; Scientists aren't communicating with one another about important issues and or data findings regarding climate change and other environmental conflicts. This leads to a lack of communication and understanding amongst the greater scientific community. Policymakers are then provided with a form of misinformation that makes it impossible for them to reasonably address climate issues through legislation, or by other means. This also, from an environmental politics standpoint, forces states to hold on more closely to finite, non-renewable resources such as fossil fuels, rather than cooperating to reduce their use on the global scale.

The implications for scientific reductionism as a form of misinformation in the environmental sphere are vast, because it denotes a lack of equilibrium in the study of the environmental issue. Essentially, this amounts to the fact that, on one hand, a certain level of detail and scrutiny is required to produce thoughtful, intelligent research. But, allowing the focus of a discipline or study to become too narrow to the point where it negates cooperation in a multidisciplinary sense, is unacceptable. This is due, as the article points out, to the global, interdisciplinary nature that is inherent to the climate change issue, and which makes it different from any other international political crisis.

While this article was written thirty-seven years ago, it has remained extremely prevalent, especially in the past five years. It highlights how powerful the peoples knowledge of environmental and climate science can be against the corruption of partisan reductionist science and implies the importance of public interest science in order to combat these conflicts. The article exposes how partisan science and "special vested interests" held by reductionists and policy makers, bend public policy in the favor specific agendas.

These decisions result in environmental destruction not just in the U.S., but across the globe. The author, Vandana Shiva, is an Indian environmental activist and scholar. In 1972 she received her Bachelor's degree in physics from Punjab University, Chandigarh. In 1977, Shiva went on to pursue her masters degree at University of Guelph in the philosophy of science. A year later she received her PhD in Philosophy from the University of Western Ontario. Vandana is also the founder of the Research Foundation for Science, Technology and Ecology.

Throughout this extensive research article conducted by the Pew Research Center, we see a debate for the future years of misinformation diffusion. Will experts see a reduction? Will there be significant improvement in technology or societal solutions to combat misinformation? Amongst the scientific consensus, Anderson et al, states that there is a debate between those that see the "dark side of humans being aided by technology" and those that believe there is hope in technological improvements for the reduction of misinformation.

One of the main themes of this article is the "information environment" we live in. Regardless of it being a human issue or a technological issue, both sides can agree that in order for this said environment to improve, technology must effectively counter the flood of misinformation by; labelling, filtering, and or banning the dissemination of misinformation. There is also a focus on advancing and improving the publics ability to properly judge, analyze, and decipher the quality of information they are witnessing. While efforts to monitor and improve the tech world are conducive and advantageous, more must be done on the front of public support and funding. The public must also "elevate information literacy to be a primary goal of education (Anderson et all 2017)." Within this study, a nonscientific canvassing was conducted. Over one-thousand participants were asked a variety of questions, which they were then expected to respond to in detail. The author, Janna Anderson is a professor of emerging media and digital journalism at Elon university, North Carolina, as well as a contract researcher for the Pew Research Centers "internet Project". Anderson received her Masters Degree in Journalism and Emerging Media, from the University of Memphis, Tennessee in1999.

Chapter 3: Methods

In an age where media is intertwined into basically every aspect of our lives, it is crucial that we are aware of its affects on our ability to obtain true information. The constant influx of misinformation that circulates throughout our media perpetuates myths and disbeliefs regarding important world issues, specifically climate change. As this misinformation continues, climate science is being clouded, which makes it extremely challenging for the general public to access accurate and truthful information that concerns everyone. This is extremely detrimental to our life on this planet. This issue becomes amplified when it is mixed with a lack of media literacy; without it these myths and disbeliefs regarding climate science will continue to be perpetuated. I intend to conduct a qualitative and analytic study that focuses on what ways the spread of misinformation by the media perpetuates myths and disbelief regarding climate change as well as how the lack of media literacy in the U.S plays a role in this uncertainty and disbelief.

In the beginning of my research, I was leaning towards a focus on climate change and how agricultural and livestock production was one of the worlds leading producers of toxic greenhouse gases. Though when I started searching through the "discovery search" using terms like "livestock farming" and "greenhouse gas emissions" I found myself faced with way more scientific and mathematical data than I had anticipated. I thought a lot about how I could still speak on the issue of climate change without conducting quantitative research, which was challenging at first. In the back of my head I kept thinking "people need to know what is happening", "why don't people know more?", "what ways could I get peoples' attention about our climate issue?". Media literacy and the role it plays within peoples knowledge and or belief in climate science seemed like it fit perfectly into why one would be influenced by misinformation despite clear scientific fact. With this being said, I eventually decided to hone my focus on a more sociological aspect, looking closely at the way climate misinformation is spread within our media, how we assess and interpret said media and how that effects trust, belief and perceived validity in climate science.

With these aspects in mind, I utilized the Purchase College Library Database to locate literary sources that would provide me with supportive evidence for my topic. I started looking through the "Databases by Title" and the first one I clicked on was Academic Onefile. I typed in the words 'misinformation' and 'climate change', finding a variety of sources that somewhat pertained to my topic in terms of misinformation, but went a different direction. Many of the articles pertained to covid-19 and the vaccine, or had some sort of political element. I looked through other databases like: Environmental Science Database (ProQuest), JSTOR, EBSCOhost, and Research Library. I then decided to type in some key words into the "discovery search" bar using key words like misinformation, disinformation, climate change, environment, media literacy, media coverage, or even phrases like "climate change within the media", "misinformation regarding climate change", "media coverage and environment". As I continued to add different terms and switch them around in different orders, I found thousands of different results to look through and analyze. After taking a significant amount of time I started to narrow down my search, luckily finding a considerable amount of viable information within each of my found articles.

To analyze my found information I started by downloading each of the sources to my computer so that I could highlight and annotate the articles as I read them. I found this to be extremely helpful for me to easily go back and refer to important information and or quotes from the authors as I wrote my literate review. Without doing so, it would have taken much longer to create a cohesive layout of headings for the literature review. I started with each of my articles by reading the abstract, as well as any key points or important terminology that should be known prior to reading the literature. I slowly analyzed each of the articles, carefully highlighting sentences and factual evidence that I thought connected well to the central themes of my research. During this process I tried to identify how each article was set up, whether it was procedural, like research and findings, or thematic. This was helpful for me to figure out how I would plan my literature review. Within this review I organized my found information into subheadings that describe in detail the objective of my research question. In conclusion, I chose a systematic literature search because it allowed me to properly organize my thoughts, create a structured body of ideas for my research questions, and enforced a practice of careful analysis.

Throughout my process of research and analysis, I found myself facing a few imitations. I would find sources that seemed to be full of extremely helpful information, but once I looked deeper into it, there was so much numerical data that required me to understand numerous charts that I was not familiar with. Another limitation I faced was the time frame I had to read certain articles, many that I found were very lengthy and I was concerned that I would take too much time reading one article. I also found myself realizing so many other avenues I could take with this topic, but time would not permit me to do so.

From the beginning of my research to now, I certainly have a bias when it comes to my topic. I have a solid belief in climate change and climate science. I feel that if I didn't believe in the science it would contradict my whole study. I believe that the spread of misinformation has and continues to be detrimental to the validity of climate science and the wellbeing of our societies. It is crucial that we combat this spread by finding education tools that maintain a resistance to misinformation.

Chapter 4: Results and Findings

The issue at hand is society's current inability to differentiate between news that aims to inform versus news that aims to instill false ideas for an ulterior motive. The majority of the citizens in the United States are either not aware or lack the knowledge to be media literate. However, with the combination of this research and action, there are ways to navigate these troubled waters and sow the seeds of knowledge to guide one through the sea of information in the media.

Misinformation and Where We Find it

Misinformation as a term, covers any misleading information that is spread from one person to another, regardless of the intent of the person to deceive another. Treen et al. (2020) states:

> A common theme is that misinformation pertains to information that is false, inaccurate or misleading; note that to be misleading, the information itself need not be false, but may be presented out of context. Differences between definitions concern the intention behind misinformation. (p.3)

Misinformation is not to be confused with disinformation, which is deliberately false information that is purposefully spread to confuse and deceive the public. As modern technology has advanced to astonishing heights, the ability for information to be shared and consumed is possible in a multitude of ways. There are numerous media outlets that allow virtually anyone to utilize it and convey information regardless of its validity or truth. This can be extremely damaging to society and its ability to access life altering information like that of climate change and global warming. We find a majority of climate change misinformation within social media platforms like twitter, instagram, Facebook etc. These platforms make way for bots and spammers to generate and spread misinformation on a daily basis, planting seeds of question and doubt in the public mind. We also find massive amounts of misinformation generated from "echo chambers", which are concentrated groups of individuals who have similar views and intention when it comes to spreading misinformation.

The Spreading of Misinformation

When we think about the spread of misinformation we need to pay attention to who is behind it and why. Misinformation is largely spread through the voices of paid corporate and philanthropic actors on various media platforms. These paid actors are funded by big corporations and industries with conservative ideologies, i.e fossil fuel industries. This funding is then passed on to producers of climate change misinformation within a variety of media outlets. Political and religious groups use this misinformation to spearhead self interest campaigns and organizations that work daily to perpetuate myths and disbelief regarding climate change as well as completely ignoring our contribution to the issue.

As much of our media becomes clouded by misinformation from these funded self interest groups, their influence begins to take hold of the public mind. The influence of previously mentioned "echo chambers" even further perpetuate a feed back loop of misinformation(Treen et al. 2020). As more people become "infected" by misinformation through acts of social communication, they then "infect" those who are "susceptible" to said misinformation. Those who are susceptible, usually do not possess proper media or information literacy, which is essential for analyzing and assessing information from the media.

Psychological Responses to Media Misinformation

It is extremely important to analyze the psychological aspect of how and why misinformation spreads within the media. The way media messages are interpreted relies heavily on ones individual beliefs, motives, values, and familiarity. Millions of media messages are produced every day and unfortunately most of these messages are false or highly misleading. “Developing effective interventions against misinformation depends on understanding the underlying psychology” (Pennycook et al. 2021). The main question is why do people believe and or share the misinformation they see online?

Truth discernment is the ability to properly judge the information you are presented with. Proper truth discernment gives one the ability to identify what is true within a sea of misinformation. Deliberative reasoning allows one to correct their initial intuitions when analyzing media messages, lowering their chance of believing the false or misinformation. “Across numerous recent studies, people who are more reflective are less likely to believe false news content – and are better at discerning between truth and falsehood”(Pennycook et al, 2021, p.5). Interventions that aim to promote analytic thinking, reasoning, truth discernment, and accuracy need to be put into effect so that more accurate and truthful information is being circulated throughout multiple media outlets, which in turn can improve media algorithms.

A Lack of Media and Information Literacy

Media literacy is essential when discussing public acceptance of climate change science. It is crucial that one has the abilities to properly assess and analyze media messages and information regarding climate change so they can formulate their own educated conclusions and opinions. Our collective lack of information/media literacy plays a major role in the perpetuation of myths and disbelief regarding our climate crisis. For decades scientists have known and continued to track the negative effects that our actions have on our planet, which have only gotten worse.

Climate change threatens public health and national security around the globe, yet policy makers fail to acknowledge the issue. Although part of our issues lie in climate literacy, a large portion of the issue lies within the disparities between policy and public knowledge. These disparities derive from current approaches to science education, climate change deniers intentional use of mass media to distort and confuse, and simply the nature of mass media. The amount of information within the media from scientists or science education groups is vastly outweighed by the daily influx of public entertainment and persuasive information by unreliable sources.

"Science education and educators must make a shift to more effective learning strategies that enable trust, emphasize empowerment through reasoning skills, and embrace the maturing discipline of media literacy education" (Cooper., 2011, p.231). While thinking about learning strategies that can support us in being media literate, we should also give attention to the emotional turmoil that comes with communicating climate change information to those who have previously rejected the science. Communicating climate change science through the media can be tricky for a few reasons, the first being: the challenge climate science poses on certain worldviews. The second being the in-depth scientific knowledge needed to fully understand climate change.

It is a complex poly-crisis we are undergoing, one that is difficult to fully comprehend and accept due to its painful realities and needed transformation. The sensitivities around the conversation, the emotions in the room, and how to communicate the facts, can be inhibiting to discussing the issue. There are four key ways climate change can be effectively communicated to the public, them being: "Acknowledge and use the nuances of emotion but avoid focusing on fear, affirm the science through culturally appropriate messages and by highlighting the scientific consensus, counter disinformation by inoculation or well-designed debunking, and focus on policies instead of climate attitudes Lewandowsky (2021)”.

Effects on the Validity and Overall Belief in Climate Science

There is a consistent spread of climate change misinformation throughout the media that is perpetuated by: monopolizing corporations i.e fossil fuel industries, self-interest groups, politicians, climate science deniers, and skeptical bloggers. On a daily basis, these various sources diffuse an overwhelming amount of misinformation into our media sources that make it extremely difficult for the general public to decipher between what is true, what is not and what is being exaggerated. Drummond et al. (2020) state:

> We view fake news as a subset of misinformation in that fake news mimics news published by reputable news media outlets, but is not generated through the same editorial processes used by reputable outlets, including thorough fact-checking and multiple layers of review. (p.2)

We see a pattern of seemingly reputable sources all throughout our media consumption. With the financial support of industrial, corporate and philanthropic actors, political and religious organizations i.e “front groups” are actively building a considerable and seemingly reliable presence within our media. This paired with a lack of media literacy greatly affects the overall belief of climate science. It is crucial to have the ability to properly assess and analyze all forms of media information so one can decipher between what is true and what is false. When one does not have proper truth discernment or careful reasoning it is very easy to fall victim to misinformation. This in turn diminishes an overall belief in climate science.

Cooper, (2011) explains that ISE or traditional informal science education (science education outside of schools) does not emphasize critical thinking and works on the assumption that those without scientific knowledge need to be taught through a one way transmission of information. ISE also doesn’t address the major gap between policy action and climate science. With this being said, science education needs to embrace reasoning skills and media literacy education in order to gain an overall trust and belief from the public. As Shiva et al (1986) states, “peoples knowledge can become a countervailing force in resource destruction.”

While the lack of media and information literacy indeed plays a major role in the effects of climate science validity and overall belief, we must also bring focus to the major drop in public trust in the scientific consensus and how that plays into the public's belief. We can attribute the drop in public trust in scientific consensus to the aforementioned self interested groups, whom encourage and incite the questioning of the scientific consensus with the approach of rhetorical questioning. According to Van der Linden et al (2015), “increasing public perceptions of the scientific consensus is significantly and causally associated with an increase in the belief that climate change is happening”.

Inoculation Theory and Proper Media Literacy Education

In order to work against the constant spread of misinformation partnered with the lack of media literacy, we must incorporate proper media literacy and science education as well as preemptive interventions that help reduce the influence of misinformation. Without it public misconceptions, and overall disbelief and trust regarding climate science will continue to grow. It has been extracted from the research that proper media literacy education and the “inoculation process” are two of the leading strategies and or mechanisms discussed within the subjects of media misinformation and climate change science.

According to Cooper (2011), teaching accurate media literacy education must include three essential questions. The first being to question the audience and authorship, is there a bias? What is the reason it was made? Next, one must question the content in its entirety. Who and what is information about? Identifying the ideas and values that an author is presenting is extremely important. The viewer must also recognize what may be left out of a particular media message and how might it be interpreted differently to someone else. It is pertinent that one hones in on their critical thinking skills. Finally, questioning the representation of a particular source is extremely important. When was it made? where or how is it shared to the public? We must identify if our sources are fact, or merely opinion. Media literacy education aims to education people in critical thinking techniques. Suggested techniques from academics in this field include: flow charts, “fake news” games that intend to improves ones ability to recognize false news, PARCS teaching techniques (Purpose, Author, Relevance, Currency, Source), guidelines in the form of questions that help social media users evaluate source credibility, and simply increasing the general school curriculum's to fully cover climate science.

Cook et al. (2017) states: “We recommend that climate communication messages should take into account ways in which scientific content can be distorted, and include preemptive inoculation messages.”(p.1) Cook et al. (2017) continues to explain how inoculation theory is simply the process of one being “inoculated” against misinformation. This can be done by a process of being exposed to a refuted version of a media message before ever seeing said media message. Just as one gets a vaccine to to resist future viruses and generate antibodies, inoculation messages aim to do the same thing. “There are two elements to an inoculation: (1) an explicit warning of an impending threat and (2) a refutation of an anticipated argument that exposes the imminent fallacy Cook et al. 2017, p. 4).”

We are in an era of post-truth, meaning our general public has lost trust in media information, despite said information being evidentially factual. In order for climate science to truly be heard by the minds of a skeptical public, we must go beyond the affirmation from scientific consensus to properly combat scientific misinformation. This is where the inoculating process comes into play, "public attitudes about climate change can be successfully 'inoculated' against misinformation by exposing people to a dose of refuted arguments before they hear them" (Farrell et al, 2019, p.192). This provides the public with tools to identify misinformation as well as providing them with a supply of "counter arguments" (Farrell et al, 2019) to combat the misinformation on an individual level.

What Can We Do With This?

Through the research done by Cook, Lewandowsky and Ecker, in the article "Neutralizing misinformation through inoculation: Exposing misleading argumentation techniques reduces their influence", it was found that both elements of inoculation were successful in neutralizing the negative influences of misinformation.

> "The purpose of this type of intervention is to stimulate critical thinking through the explanation of argumentative techniques, thus encouraging people to move beyond shallow heuristic-driven processing and engage in deeper, more strategic scrutinizing of the presented information". (Cook, et al., 2017, p.15)

It is crucial that we incorporate the inoculation process into our education systems, both formal and informal. It is important to think about the future of the online information environment in decades to come. What will it look like? How will it influence the way we think? In 2017 a large canvassing was was conducted by Pew Research Center and Elon University, asking a variety of scholars, technologists and strategic thinkers what they believe the next 10 years of the online information environment will look like.

> "will trusted methods emerge to block false narratives and allow the most accurate information to prevail in the overall information ecosystem? Or will the quality and veracity of information online deteriorate due to the spread of unreliable, sometimes even dangerous, socially destabilizing ideas"? (Anderson et al, 2017, p.3).

According to Anderson et al, (2017), 51% said the information environment will not improve, while 49% said it would improve. These differing opinions boil down to the age old debate: are humans innately good or bad? Will humans continue to utilize the media world for “not-fully-noble purposes” (Anderson et al, (2017) or will they take what is known and use it towards a future of trust and truthful information.

Apart from advancing media literacy education and applying the inoculation process to the public, academics in these fields of study have also suggested other implications that have the potential to combat the spread of misinformation. Treen et al. 2020 suggests, technological solutions like programs that detect malicious intent from sources and accounts online, ranking and selection algorithms. They also suggest possible regulations, fines and or imprisonment for those who perpetuate false information in the media.

Chapter 5: Discussion and Conclusion

It is a conflict of our own era; in a time where we have the technology to mass inform the public by the click of a key. We entered a stage that demands a certain amount of critical thinking skills, and the capacity to differentiate between propaganda and facts. Misinformation is not necessarily consumed willfully, rather it is forced upon us purposefully. It is our duty as humans to navigate these obstacles of information biases and the differences between belief and fact. Through the research, it has become clear that there are ways to support society and inform critical thinking skills. This would bring a sense of power and community to our entire society. Despite the crisis at hand, it could be a crucible for new ways of being, a transformed value, and a fact vs. belief system. Although the metamorphosis is borne of disaster, it can be solved with a collective response, one of the foundations of a knowledgeable, unified society.

Throughout this study, the spread of false or misinformation within our vast world of media is of primary focus. False information by the media perpetuates myths and disbelief regarding climate change. This is done by means of purposefully designed and intended generation of fake news that mimics published reputable sources. The generation and dispersal of seemingly trustworthy and reliable media information is executed through the financial support of self-interested industrial, corporate, and philanthropic actors, and political and religious organizations i.e. “front groups”, that make it their top priority to confuse and mislead the public. With this confusion and misinformation perpetuated on such a large scale, the room is made for the myths and disbeliefs regarding climate change science to take root in the minds of the general public. These self-interested groups then push questioning of scientific consensus and rhetorical questioning. Paired with fake news

The lack of information literacy in the US also plays a major role in this uncertainty and disbelief. Media information literacy is essential when discussing public acceptance of climate change science. It is crucial that one has the ability to properly assess and analyze media messages and information regarding climate change. Not only so one can formulate their own educated conclusions and opinions, but so one can go out into the world and make a difference. Our collective lack of information/media literacy plays a major role in perpetuating myths and disbelief regarding our climate crisis and restricts us from generating real change. For decades scientists have known and continued to track the negative effects that our actions have on our planet, which have only gotten worse; yet policymakers fail to acknowledge the issue. The amount of information within the media from scientists or science education groups is vastly outweighed by the daily influx of public entertainment and persuasive information from unreliable sources. While a large portion of our issue lies in media information literacy, much of it concerns the disparities between policy and public knowledge. These disparities derive from current approaches to science education, and climate change deniers' intentional use of mass media to distort, confuse, and simplify the nature of mass media.

With proper science education and or application of media information literacy, one can acquire the tools to accurately discern between false or accurate media content. It is also implied throughout the various academic literature that mechanisms like the “Inoculation Process” is also used as a means of combatting and “arming” individuals with the means to counteract the influence of false media. Individuals must hone in and grow their critical thinking and reasoning skills, as well as learn to question and assess the media they observe. Without the application of these crucial skills, methods, and mechanisms, the lack of media information literacy will continue to add to the myths and disbelief regarding climate change science, if not worsen.

Given this information, educators, academics, scientists, and humans of the world must actively band together to put the tools and systems that have been researched in motion and apply them to life; to remember the power of knowledge and unification. As a society, we have the capacity to cultivate media-literate human beings with the motive and tools to analyze and process media. Whether that be media with the basis to inform or with a basis to propagandize, with an emphasis on information regarding climate science.

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