CLIMATE CHANGE DISCOURSE AS GENDERED COMMUNICATION

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Abstract
Climate change is one of the most critical threats facing the 21st century. The effects on the planet, humankind, jobs, food supply, and other vital resources increase every year. Those communicating these details to the American public through mass media are doing so with gendered discourse. This study analyzes three speeches from predominant climate change communicators representing three different platforms: politician Al Gore, cultural figure Leonardo DiCaprio, and climate scientist James Hansen. Using discourse analysis informed by feminist standpoint theory, this study suggests that frames, words, phrases, and communication styles embedded in discussions of climate change continue to use gendered language reflecting patriarchy (Hallstein, 1999; Harding, 1986). Gendered climate change discourse reflects male worldview (Bee, 2013), muting the female gender’s voice and way to frame its occurrence. The major gendered themes or categories identified in the study include: patriarchal reinforcement of the gendered military symbolism, instrumental rationality as a mode of gendered communication, and “report talk.” Acknowledging these gendered tropes could bring all genders into climate change policy creation and outreach efforts.
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Chapter 1: Introduction

Climate change has been described as the greatest challenge our generation will face. This now political topic has been a divisive one throughout the United States. The International Panel on Climate Change (IPCC) synthesizes data and analysis on climate change is the leading scientific body on the subject. The assessment by the IPCC of the severity of climate change is dramatic. “If left unchecked, climate change will increase the likelihood of severe, pervasive and irreversible impacts for people and ecosystems” ("IPCC - Intergovernmental Panel on Climate Change," n.d.). Those leading the charge of discussions around climate change primarily present information through the male voice with a male bias in content (Greer, 2014). Females occupy scientific positions and are part of the fact-findings components learning about climate change and finding ways to counteract its damage to the planet, however; more females are involved in the community outreach portion of climate change (Salmon, 2013). “Women often have a strong body of knowledge and expertise that can be used in climate change mitigation, disaster reduction and adaptation strategies,” ("WomenWatch: UN Information and Resources on Gender Equality and Empowerment of Women," n.d.). The female voice and women’s social engagement (Mies & Shiva, 2014) are the missing elements to the conversations surrounding climate change. The greater inclusion of this female perspective could alter the public discussion and perception of this issue, as has happened before when women’s voices and views entered the discussion around other topics.

Conducting discourse analysis of speeches from a climate scientist, a public advocate, and a political figure: James Hansen, Leonardo DiCaprio, and Al Gore, this study illustrates how climate change communication commonly incorporates an ideological male perspective.
Importance of the Study

Within ecological and environmental fields, the absence of the female presence has been researched (Bee, 2013; Harding, 1986). Researchers, Bee (2013) and Harding (1986) suggest the dominance of the male voice in language and industries like science and government deems the female voice powerless. At the forefront of the research is evidence that women are the most affected by climate change, yet are not part of the messaging, outreach, or policy changes (Hemmati & Röhr, 2009). Previous research provides insight into the political and social shaping of how climate change directly affects a gender, and this study seeks to add to the discussion by analyzing the gender-saturated language and arguments of popular and well-known public figures whose messages reach millions of people. Their influence on the American public elevates their words and frames the discussion on their terms.

Statement of the Problem

Previous research concludes the male-dominance in language and a continuation of patriarchal lineages, which undermines the full scope of presenting concerns, issues, or general information to the American public—all genders are not fully represented in discourse. This research examines climate change discourse as an area of concern for the lack of gender inclusion and patriarchal dominance by focusing on predominant public figures to discover gendered language.

Definitions of Terms Used

Gender: This study explores gender in terms of the social construct and not the biological makeup for a person.

Ecofeminism: Eco-feminism demonstrates that the same masculine systems of power and dominance that oppress women are also oppressive to nature.
Patriarchy:  Systems of government or of society that organize through a lineage of power to the male gender, which often is to the exclusion of females, instrumental rationality focuses on the a cost-effective approach to problem solving.

Report Talk:  This is a style of communication associated with the male gender as a way to illustrate knowledge through facts and figures in lieu of cultivating an emotional connect with those the person is speaking to.

Rapport Talk:  This style of communication is associated with the female gender, one that garners a connection with its audience to create a connection.

Organization of Remaining Chapters

The subsequent chapters are organized as follows: a review of literature, scope and methodology of the study, the study, and summaries and conclusions. Chapter 2 reviews research done surrounding gendered language, science and technology as gendered fields, and climate change as gendered. Chapter 3 consists of methods and scope used to analyze climate change speeches, and Chapter 4 contains the results of the study depicted in frames that emerged from analysis and a discussion around those results. Chapter 5 offers limitations of the study, recommendations for future research, and the conclusion.
Chapter 2: Review Of The Literature

Introduction

This chapter examines literature regarding gendered language, the presence of gender in science and technology fields, and frames a discussion of climate change and gender. Information and study on the connection and exact instances where the discourse of climate change is gendered from a contextual viewpoint is lacking. Such insight could illustrate the power of language and gender in the communication surrounding climate change. Never before has this topic been as needed as with the current discussion of climate change, which is one of the most pressing environmental concerns of all time and is shaped by language, science, and technology. This chapter describes the philosophical assumptions along with the theoretical framework and literature around the study of how climate change discourse is gendered.

Philosophical Assumptions

Science and natural resource researchers communicate with a male gender bias (Harding, 1986). Those selected in the United States, either by elected means or by their cultural importance, to communicate to the general public about findings in climate change, its severity, and what people can do about it, also mostly do so with male-dominated discourse. Without gender equality, the viewpoint of what makes climate change one of the most important issues facing this generation for all genders is lost.

Gilligan (1982) states that ethics of care brings a female voice to a male-dominated landscape of moral and ethical theories. Through her research, Gilligan discovered that to have relationships with others, or to relate, women tend to separate themselves, or their voices, from others. Women’s socialized ways of communicating moral dilemmas are based on care and empathy (Bloom, 1990). Through ethics of care, Gilligan states that it is important that everyone
has a voice, is listened to, and is heard ("Carol Gilligan," n.d.). Giving a voice to both genders—gendered based not upon biology but on the social constructs—provides different outlooks, perspectives, and ways to move forward in the climate change discussion and in the fields of science and technology. Gilligan states, “A feminist ethic of care guides the historic struggle to free democracy from patriarchy; it is the ethic of a democratic society, it transcends the gender binaries and hierarchies that structure patriarchal institutions and cultures” ("Carol Gilligan," n.d.).

Ethics of care works to resist the injustices that are patriarchal ("Carol Gilligan," n.d.), and likewise MacKinnon states that society has revolved around the hierarchy of power and oppression toward women for so long that it seems like a natural state (MacKinnon, 1989). MacKinnon’s interests reside in the economic and political ramifications of the hierarchy of the gender social constructs that favor men and the male voice.

Climate change discourse without elements of ethics of care give way to the social construct of gendered communication about a notably serious topic. At stake is a delivery of such critical information that is not well-rounded, failing to incorporate aspects from both genders for a wider reach and potential actions from male and female genders. Ethics of care evokes the need for justice in bring forth all genders in the fields of science and technology—allowing for an inclusive system and ends the hierarchal positions of power that have historically alienated the female voice.

Theoretical Framework

Research into inclusion of the female voice in climate change context can be viewed through the lens of the feminist standpoint theory, derived from the standpoint theory (Harding, 1986; "Internet Encyclopedia of Philosophy," n.d.). Feminist standpoint theory states that
knowledge is socially situated from the place the person views the world (Bee, 2013), and how social hierarchies like race and gender affect the production of knowledge. The field of natural sciences is a place where this theory illustrates how power relations exist and where women find exclusion (Bee, 2013; "Internet Encyclopedia of Philosophy," n.d.). Feminist standpoint theory, when applied to marginalized groups and those facing oppression, states that these groups can eventually find a state of consciousness that leads to freedom (Harding, 1986).

Pivotal feminist standpoint theorist Sandra Harding states that viewing the world through marginalized groups like women can provide a framework for understanding the construction of power relations (Harding, 1986). These constructs of power are found in the hierarchy of knowledge in relation to climate change. The male voice, which is non-dependent on the biological makeup of those in power, is found throughout the conversations surrounding the environment and climate change (1986). This field of study is largely thought to be in the male domain, which is illustrated in the statements and context communicated.

Hallstein (2009) identifies the feminist standpoint theory as a way to recognize the diversity in people, not solely on the basis of gender. She equates this portion of the standpoint theory and feminist theory as a way of looking at a “revisioned” communication ethic that values care (p. 34). She states that feminist standpoint theories vary, dependent on the employment of the theory, but there is a constant theme, “Knowledge is socially related and arises in social positions that are structured by power relations,” (p. 35). Power is dominated by males and females share in this commonality, which has led to oppression, abuse, neglect, and oversight. From this viewpoint of the world, women—or those who are powerless--frame their own perspective.
Likewise, this research extends to the concept of ecological feminism, which explores the relations between feminism and nature (Greer, 2014; Mies & Shiva, 2014). Eco-feminism reaches beyond just the nurturing nature of women as seen through essentialism, and views the male-dominance over wars, injustices, and conquests as going against nature itself (Greer, 2014). Easing the damages done by the exploitation of Earth requires a total change in what is taking place, led by the patriarchal society, to create global warming and a planet that is dying (Geer, 2014; MacSwain, 2009).

The Literature

**Framing the gendered climate change discussion.** The current discussion of climate change throughout the American mass media and in academia centers on the issue of women being the most affected by the destruction of agriculture and women’s dependence on energy ("Is Climate Change a Feminist Issue?" n.d; Reid, n.d.). *Engendering the Climate-Change Negotiations* (Hemmati & Röhr, 2009) depicts the concept of the female voice inclusion into the climate change discussion when applicable to the agricultural and economic plight of women as a narrow viewpoint. The terms *climate justice* or *climate equality* are not bringing about needed change from this viewpoint. “The debate on climate change has been very narrow, focusing on the economic effects of climate change, efficiency, and technological problems” (p. 20). From the standpoint of the gender makeup of those making decisions on climate change, the female presence is lacking (Hemmati & Röhr, 2009; "Is Climate Change a Feminist Issue?" n.d; Reid, n.d.). Broadening the climate change discussion to include women—their voice and participation—can strengthen policy-making efforts and bring about equity (Hemmati & Röhr, 2009; Reid, n.d.). “In other words, the quality of policy making will remain unacceptably low, if
the discourse does not consider the gender issues, including relevant differences between women’s and men’s experience” (Hemmati & Röhr, 2009, p. 20).

Limiting the discussion to terms related to economics and agriculture shapes the overall public discourse. *How Grammatical Choice Shapes Media Representations of Climate (Un)certainty* (Bailey, et al., 2014) examines how language choices can make the conversation of climate change by the science community less understandable, casting doubt on science findings based on language used on within the IPCC itself. Language is an important factor in the public’s understanding of climate change. However, if the language used in communicating about climate change is gendered, the seriousness of its implications may not be fully addressed for the general public to make informed decisions about the topic. Despite their lack of participation in policy-making or public discourse, women understand the severity of the issue of climate change. When it comes to knowledge and concern over the issue, women show a greater capacity for both (McCright, 2010), based on eight years of Gallup poll information from a national sampling of adults. Women hold more of the accurate information about climate break down assumptions of the male-dominated field of science.

If the knowledge base is there, as the studies show (McCright, 2010), the use of appropriate language could bring about climate equality, where all genders are fairly represented in the decision-making process and in the outcome goals of climate change. Additionally, and where research gaps arise, language more in-tune with the female speech communities could cultivate a sense of activism and outreach.

The tone and complexity of the content used to frame and communicate climate change is also an important concept. How the cause is communicated can be achieved by building a rapport with listeners, which is also considered a female-gendered trait and a way to build
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connections or relationships, or by using report talk, which is primarily exhibiting knowledge by imparting information (Tannen, 1990). While this is a conversation style, this concept implies that the storytelling of the climate change crisis could be communicated in a way that is inclusive of the female voice, which works to build rapport with larger audiences. This also shows evidence of another way gendered climate change discourse is discussed.

**Gendered language.** The choice to use certain words or phrases is an important factor in the climate change discourse, stemming from the language used by key communicators. Male-dominated language, or language that is gendered, penetrates our perceptions and influences our beliefs (Boroditsky, 2009; Haraway, 1998; Prewitt-Freilino, et al., 2012). For the purposes of this research, the term ‘gender’ does not refer to the biological makeup of the male/female anatomy. It is important, however, to provide context of how ‘gender’ profiles society and how it shapes perceptions and modern language. American English distinguishes between sex and gender (Haraway, 1998), which builds societal constructs of the division of labor and societal constructs of power that are relevant in today’s politics and culture (Prewitt-Freilino, et al., 2012). Donna Haraway (1998) writes of the word ‘gender’ as depicting a ‘difference’ between the sexes. “Gender’ was developed as a category as a way to explore what counts as a ‘woman’, to problemize the previously taken-for-granted,” (p. 90).

The construct of the word and idea of ‘gender’ shapes and influences language and perceptions of power (Boroditsky, 2009; Prewitt-Freilino, et al., 2012). “In sum, power is the single most important organizing concept in social and political history,” (Savignon, 2006, p. 88). With power, change can occur—or the status quo can be upheld (p. 89). This is an important concept in the climate change discussion because as the male gender continues to hold power, progress toward accurately and effectively communicating the science and social
implications of the issue is hindered—or put in a different way, communication is one-sided with a bias toward the male gender. Savignon (2006) brings the scholarship of the female voice within applied linguistics. Ascertaining equality for information and knowledge gathered for this field can speak for all fields of study and throughout society:

We must also make a continued effort to increase the number of women in positions of leadership and authority and support and support them in those roles. Feminist at all professional ranks, women and men, need to answer the call to focus on women’s empowerment and encourage the advancement of feminist scholarship. (p. 91)

Gendered language created by a lack of female presence at all levels shapes the perceptions of society to further engender concepts and beliefs (Prewitt-Freilino, et al., 2012). *The Gendering of Language: A Comparison of Gender Equality in Countries with Gendered, Natural Gender, and Genderless Languages* (2012) illustrates how countries with either gender neutral or genderless language creates an opportunity for gender equity. Language takes shape based on cultural conventions which then shape the way people in that society see and organize the world around them (Boroditsky, 2009; Prewitt-Freilino, et al., 2012. Working toward gender-neutral languages can lead to gender-neutral societies (Prewitt-Freilino, et al., 2012).

Moreover, gender asymmetries exist to further empower language as male-dominated (pp. 270-271). Words with gender asymmetry like stewardess,’ which has been separated from ‘steward’ to mean someone who takes care of the household domestic affairs. ‘Stewardess’ becomes the female word for ‘steward.’ Other terms provide more insight to the male-dominance of the English language with false generics (p. 270). This is exemplified with the generic use of the masculine pronoun, ‘he,’ to cover both genders. Gender and language are deeply intertwined,
making it difficult to ensure perspectives from all sides are included in society, politics, education, science, technology, etc.

Cohn (1987) pinpoints how gendered language enters the lexicon of those in the industry that language serves. Presenting the example of her work with nuclear defense analysis, Cohn coined the term “technostrategic” to illustrate how intertwined the nature of technology was with nuclear strategies. This field had a specialized language filled with terms and phrases that allowed the analyst to disengage with the enormity of what they were saying. These were things like “war,” “nuclear power,” and “counterforce exchanges.” After a year of observing this discourse, Cohn learned this specialized language and found that her own thinking was changing. The term “counterforce exchanges,” a male-dominant term due to its implications to militaristic (male-dominated industry) activity, may not bring visions of a village being destroyed in war with distance from the words being said through specialized language. This research offers an interesting guide to how language influences the world and the public. What role does this type of gendering of language play when applied to climate change discourse, and how does that influence the perceptions of the general public?

**Gendered science and technology.** One of the most prolific theorists coming feminist and science philosophy, Sandra Harding, challenges the power constructions of gender and its position in science in *The Science Question in Feminism* (1986):

The broader social and political context in which discrimination against women in science occurs is part of gendered social relations more generally, and is also part of the psychic landscape within which individual masculine scientists think about themselves as well as about the nature of science. (p. 59)
Harding (1986) states that gender symbolism is deeply entrenched in the history of science. Images of data that are “hard” or “soft” reinforce gender lines in the field. The dichotomies of symbols of gendered science like mind vs. nature, reason vs. emotion, or objectivity vs. subjectivity—the latter of each being feminine—strengthen the gender divide in science (p. 125). As in the discussion on climate change, terms like “dominate” are often used to again imply masculinity. “Now we can see that the hope to ‘dominate nature’ for the betterment of the species has become the effort to gain unequal access to nature’s resources for the purposes of social domination,” (p. 16).

Climate change has been described as one of the biggest, if not the biggest, problems this generation will face. Scrutinizing where the female gender’s place is in science has been something Harding asks scholar to envision for the future, and researchers are looking at where the current landscape for females in the field lie and how it can change for the betterment of knowledge, understanding, and discussions of scientific matters for future generations.

Women make up the minority in scientific researchers, not just in the United States, but throughout the world at 29% (Hearn & Husu, 2011). The absence of the female voice in science is due to bullying, exclusion, sexual harassment, and undervaluing women’s work and contributions. Science organizations, research groups, and institutions breed gendering and male dominance (p. 104). Harding (1986) urges feminist scholarship to not look for ways to bring about gender equality in science, which could also be applicable to other gendered areas in society, but to set higher expectations. Hearn and Husu (2011) call for radical transformation in the field, where women’s voices and perceptions restructure the gender social order (p. 108). Their study offers a look into how gender and gender relations intersect with science and technology—information that could inform theory and policy if tested.
Roy (2008) writes that her experience in science as a feminist allowed her to explore how ‘asking different questions’ could lead to changes in how science is done rather than pointing out gendered language and exclusion of females in the field itself. Roy’s paper provides a model for future feminist scientists in their interactions in natural science, a way to ask questions differently—a model to resist the gender and racist biases used to create scientific theory, paradigms, and language (p. 146). Her feminist research allows scientists to see things from the dominant viewpoint as well as her own, eliminate injustices, free oneself from the dominant social order, deconstruct dominant ideologies, and redefine the tools within science that confine women. Roy’s approach, if tested, could serve research in fields like climate change in helping to achieve true climate equality through feminist methodologies.

To connect feminist theories and movements to science and ecology, the term eco-feminism has emerged. As expressed by Shiva and Mies (2014), eco-feminism demonstrates that the same masculine systems of power and dominance that oppress women are also oppressive to nature. Shiva and Mies state that women have a fundamental relationship with nature through the experiences of women. They write of the destruction of “Mother Earth” through colonization and development, war, and the onslaught of technology and materialism. “Thus, nature is subordinated to man; woman to man; consumption to production; and the local to the global, and so on” (2014, p. 5). For them, the term eco-feminism is relatively new but the concept is born of ancient wisdom about women and nature. Eco-feminism respects the connections between every living thing (p. 14). Mies and Shiva equate a change in how the environment is treated with a societal change in how men treat women—the first has to happen before the latter can be achieved.
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Rationale

The rationale for critiquing male-dominating voice in the conversation around climate change is to pinpoint the context as having a male bias. Nationally, believability and validation of the issue itself is under question. Climate change, as communicated from the male viewpoint, could sound differently if the female vernacular were more apparent:

The concepts of situated knowledge and social position are especially useful for analyzing how women’s daily activities and social locations shape what they know and how they respond to forces beyond their control, such as economic restructuring and long-term climate variation. (Bee, 2013, p. 138)

As one of the greatest challenges of the current generation, understanding climate change and its effect on society should be more universally communicated. Opinions surrounding climate change are politically charged, framed as a political issue instead of on knowledge communicated in a gender-neutral way. The male voice is shaping the conversation, despite an abundance of knowledge on the issue from all genders (McCright, 2010). It is not to say that information is not correct because it is from the male perspective. It is, however, important to understand the context communicated by those in the public eye. “Gender refers not only to women and men, but more widely also to the culture and society where women and men live and work and become socialized and are part of the larger groups,” (Eriksson & Kovalainen, 2008, p. 248). Immediate action across gendered lines could take place if contextual biases were known by the public figures making the statements about what climate change is and what the public should know about it. Ethics of care allows people to reflect on how they experience themselves in relationships with others—providing perspective in perceiving the world around them.
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Research Question

The study of gendered, male-dominant voice within the American public discourse of climate change requires empirical, qualitative research from speeches from predominant figures through the lens of the following question.

RQ. 1: What words or phrases are used in the public on climate change discourse by predominant figures that exemplify gendered communication as viewed through the lens of the feminist standpoint theory?
Chapter 3: Scope and Methodology

Introduction

Public discourse about climate change, communicated through various voices in the public sphere frames the worldviews of those who hear it (Bee, 2013; Harding, 1986). Whether the discourse is learned through cultural icons, or climate scientists, or—since this topic has become politically charged—from a politician, researching whether the tones, phrases, appeals are from the standpoint of the gendered male and how inclusive discourse is of the female voice will be examined. This study examines examples of individual exemplary speeches from each of the aforementioned three categories to gain a better perspective on the male-dominant language used to describe climate change and its effects on the planet and its inhabitants.

The speeches this study analyzes are from the following: Al Gore represents the political figure as he is a published author about climate change and is chairman of The Climate Reality Project ("AlGore.com - About," n.d.); Leonardo DiCaprio, represents the cultural personality as an environmental activist ("Leonardo DiCaprio Foundation," n.d.); and James Hansen represents a well-known climate scientist as former head of the NASA Goddard Institute for Space Studies. These climate change communicators were selected because of their high-profile status and the likelihood of the general public’s awareness of their affiliations on the subject.

Close and systemic examination of these words or phrases allows for informed communications on what is gendered language when it comes to climate change discourse. This chapter defines the scope of the study and the methodology used to analyze the chosen text.

Scope of the Study

This study transcribes three speeches in a similar public forum given by 1) a climate scientist, 2) a cultural figure, and 3) a political leader. Those figures selected from each of these
categories will provide a representative view of how climate change is communicated to the public. The average person may obtain their information on climate change from one source or another, whether it is searching for information from scientists, learning about the topic through cultural references, or forming opinions based on political representations. Additionally, gendered language is perpetuated in the science community because it is heard and retold in such fashion. Key themes or tropes will be gleaned to illustrate what gendered, male-bias communication words or phrases are used when talking about climate change (Liran-Alper & Tsarfaty, 2015).

This study seeks to raise concern over a lack of the female voice included in discussions of climate change through narrowing in on themes by using well-known climate change speeches by these highly visible figures: Al Gore, Leonardo DiCaprio, and James Hansen. This issue is critically important and is shaping the political and cultural landscape and at stake is a misrepresentation of the issue, looking at climate change from all sides and viewpoints, through gendered discourse.

Methodology of the Study

This study employs critical discourse analysis (CDA) as its qualitative methodology (Neuman, 2011, p. 165), and grounded in the feminist standpoint theory, to analyze speeches of three predominant communicators of climate change.

Critical discourse analysis (CDA), when applied to speeches from the public figures, can illustrate gendered language instances which are then used to shape public discourse (van Dijk, 1993; Liran-Alper & Tsarfaty, 2015). Additionally, framing, further discussed in the “Data Analysis” section, used with CDA identifies themes and tropes used within the above-mentioned speeches to organize and categorize the gendered language. CDA methodology examines the
injustices and inequalities that come from abuse in power through discourse (van Dijk, 1993). Specifications of using CDA to critique such speeches on climate change focus on the abuse of power and inequalities resulting from the use of gendered language, which is to say that by using such language the female voice is lost by the dominating male voice (1993). When worldviews are formed through concepts like language (Harding, 1986), it is clear that such abuse of power—the ability to perpetuate the masculine voice and hierarchy of such power (van Dijk, 1993)—should be explored.

Other researchers have studied the media and communication styles that shape public opinion of climate change (Bailey, et al., 2014). In *How Grammatical Choice Shapes Media Representations of Climate (Un)certainty* (Bailey, et al., 2014), the authors study how content used by climate scientists aid in the confusion and misunderstandings of the discourse of climate change. This study adds other popular figures to research previously done by Bailey et. al.’s work. Language used by the IPCC has set a tone for how the science is presented and news media were then responsible for taking that information and relaying it to the American public. Through qualitative research, the authors accounted for how uncertainty was constructed within text from news sources (p. 199). As language is an important factor in relaying critical information about climate change, how then is that language shaped by gender? Furthermore, what words or phrases are explicitly used to discuss climate change that is gendered? The result of such information can better inform the general public and science and political communities of the necessary inclusion of the female voice.

**Data Analysis**

This study uses the CDA method to discover frames in the text of the speeches and further explore the themes of gendered language. Framing is a way to pull content like speeches
to identify and explicitly note common tendencies used to gain a better understanding of said text (Entman, 1993). Frames define problems by finding the cause and determining the costs and benefits (p. 52). Notably, frames make moral judgments when evaluating the cause (p. 52). Within texts or images are frames that reinforce facts or judgments—these are even located when certain phrases or words are omitted which also reinforce judgments (pp. 52-53). Gender frames, then, illuminate text that is expressed through a hierarchy of power toward the male gender through language. CDA applied with framing to climate change discourse reveals the commonalities of gendered language, showcasing frames that illustrate the continuation of power and absence of the female voice. Frames to be deductively examined are largely based on the hierarchy of power and status of the male gender: male-dominated industries are reinforced through climate change discourse; economics and politics used as a rational instrument; and climate change discourse as communicated through report talk.

**Ethical Considerations**

Informed consent is not required as the videos used for analysis are already part of the public domain (Farrant, Pavlicevic, & Tsiris, n.d.). Accurate transcriptions from the videos will be the goal to ensure truthful portrayals of the climate change communicators and avoid any potential harm.
Chapter 4: The Study

Introduction

Prominent climate change communicators use gendered language to illustrate the gravity of its ill effects on the planet. Gendered communication is illustrated through the use of language and discourse reflecting patriarchy (Cohn, 1987, Harding, 1986). In doing so, gendered language frames the dialogue from the male perspective and perpetuates such one-sided discourse. This study, applying CDA and grounded in the feminist standpoint theory, illuminates the frames within the discourse of the three climate change communicators: Al Gore, Leonardo DiCaprio, and James Hansen. These speakers were identified to be included in this study because of their public presence in mainstream media around their views and thoughts on climate change. The likelihood of a person hearing about this topic either directly from one of these sources or secondhand by someone whose viewpoints were also shaped by their discourse is highly likely.

Speeches from Al Gore (2008) and James Hansen (2012) were published on TED.com to live audiences and revisited online millions of times. Gore’s speech, “New Thinking on Climate Change,” has generated almost 1,500,000 views while Hansen’s, “Why I Must Speak Out About Climate Change,” has just under 1,000,000 views. DiCaprio (2014) addressed the United Nations at a Climate Summit. The official YouTube channel for the United Nations published the video of DiCaprio with more than 1,900,000 views. All three speeches reached national and global audiences in substantial numbers. This study does analysis through CDA to determine the gendered language used to address the millions of viewers.

The following chapter contains each of the frames reflecting patriarchy and male-gendered discourse that emerged using CDA as a way to illustrate ways climate change discourse
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is gendered. The emergence of these frames was identified based on the body of research on
gendered communication and the gendering of the field of science.

Results of the Study

The occurrences of gendered language were analyzed through the use of several
strategies under CDA, The major themes or categories are: patriarchal reinforcement of the
gendered military symbolism, instrumental rationality as a mode of gendered communication,
and report talk critique.

Patriarchal reinforcement of the gendered military through symbolism. Cohn (1987)
documents how patriarchy is expressed in militarized language. The “specialized language” that
Cohn witnessed while working for a government entity began to shift her own worldview—to
something that more closely resembled the militant frame of “warrior” and “conquest.”
Likewise, these terms, phrases, and content appears in all three climate change speeches through
the analysis of CDA. The aggressive words to denote the government’s responsibility to defuse
climate change brings in military symbolism and metaphors, which also reflects the gendered
male dominance in government, science, and the military. To that end, listeners and viewers of
these speeches understand the meaning and reasoning of climate change through the lens of
gendered communication—as something levied against patriarchal industries and not on-level
with the average citizen.

Military metaphors and cues reflecting patriarchy and male-gendered speech are
embedded in descriptions of the government’s social responsibility to address climate change.
Examples are presented in the quotations below:

- Many years ago, when I was a young congressman, I spent an awful lot of time
dealing with the challenge of nuclear arms control -- the nuclear arms race. And
the military historians taught me, during that quest, that military conflicts are typically put into three categories: local battles, regional or theater wars, and the rare but all-important global, world war -- strategic conflicts. And each level of conflict requires a different allocation of resources, a different approach, a different organizational model. Environmental challenges fall into the same three categories, and most of what we think about are local environmental problems: air pollution, water pollution, hazardous waste dumps. But there are also regional environmental problems, like acid rain from the Midwest to the Northeast, and from Western Europe to the Arctic, and from the Midwest out the Mississippi into the dead zone of the Gulf of Mexico. And there are lots of those. But the climate crisis is the rare but all-important global, or strategic, conflict. Everything is affected. And we have to organize our response appropriately. (Gore, 2008)

- We need a worldwide, global mobilization for renewable energy, conservation, efficiency and a global transition to a low-carbon economy. We have work to do. And we can mobilize resources and political will. But the political will has to be mobilized, in order to mobilize the resources. (Gore, 2008)

- None of this is rhetoric, and none of it is hysteria. It is fact. The scientific community knows it, industry knows it, governments know it, even the United States military knows it. The Chief of the U.S. Navy’s Pacific Command, Admiral Samuel Locklear recently said that climate change is our single greatest security threat. (DiCaprio, 2014)

- It's equivalent to exploding 400,000 Hiroshima atomic bombs per day365 days per year. (Hansen, 2012)
Statements found in all three climate change speeches express and reinforce patriarchy and bring the militarized discourse to military, political, and governmental actions. References to military-government entities are found throughout DiCaprio’s speech to U.N. dignitaries (2014). DiCaprio relies on militarized images related to various industries to bring attention to the importance of climate change but does not relate this to how families are dealing with its adverse effects; he rather states how the U.S. Navy Pacific Command Chief knows climate change as fact. In this example, climate change’s importance is based on the security threat it creates, and not by the damage of the planet, its resources, and its people.

Gore (2008) used the militarized images as a way to underscore his importance in climate change discourse as a politician and the former vice president. Gore refers to his time as a young congressman, where he dealt with “nuclear arms control.” Language such as this is gender symbolism (Cohn 1987; Harding, 1986), and is used to frame Gore as in the hierarchy of politicians and the military where he had power to take on such “conquests.” Ultimately, Gore (2008) uses the military gender symbolism technique as a way to explain and describe climate change and environmental concerns: “strategic conflict,” he states. This use of language reinforces the need to broaden the discussions around climate change. Linking government and industrial involvement to military concepts and actions privileges patriarchy and male agency and does not evoke sentiment, care, or the feeling that all of humankind can be part of easing its long-term effects.

**Instrumental rationality as a mode of gendered communication.** All three speakers are on the same page when it comes to the simplest way to change courses in the climate change path the planet is on: taxing carbon dioxide. The reasoning to save the planet from climate change reflects economic reason or instrumental rationality (Kolodny, 2013), a manifestation of
patriarchy where the value of the environment is calculated and figured as an actual price, thus removing the notion that the value of the planet against climate change has other, non-economic qualities. DiCaprio (2014) refers to this instrument as “good economic policy” and goes on to describe industries using carbon emissions as getting a “free ride” from taxpayers. This type of language used frames the climate change discussion in very narrow terms (Hemmati & Röhr, 2009) as it uses the economics/instrumental rationality as an instrument to discuss the effects of climate change (Kolodyn, 2013). As in the frame above, the economic and political wills, as described in the speeches, to reverse the course of climate change represents areas where the male gender is the dominant voice, and where the exclusion of the female voice often occurs. This frame also falls short of including the lives of the people more directly affected by the ills of climate change—their livelihood, ability to supply food to their families, and the toll it will take on humankind—examples of care and compassion associated with the feminine gender (Gilligan, 1982).

Economic language and instrumental rationality, language used that excludes the female voice, absent of human toll climate change creates, emerges as an important discursive frame in all three speeches:

- Most people would get more in the monthly dividend than they'd pay in increased prices. This fee and dividend would stimulate the economy and innovations, creating millions of jobs. (Hansen, 2012)

- People say, "What's the solution?" Here it is. Put a price on carbon. We need a CO2 tax, revenue neutral, to replace taxation on employment, which was invented by Bismarck -- and some things have changed since the 19th century. In the poor world, we have to integrate the responses to poverty with the solutions to
the climate crisis. Plans to fight poverty in Uganda are mooted, if we do not solve the climate crisis. (Gore, 2008)

- We need to do it for our own economy. The latest figures show that the old model is not working. There are a lot of great investments that you can make. (Gore, 2008)

- The good news is that renewable energy is not only achievable, but good economic policy (DiCaprio, 2014)

- We need to end the free ride that industrial polluters have been given in the name of a free market economy. They do not deserve our tax dollars. They deserve our scrutiny. For the economy itself will die if our ecosystems collapse. (DiCaprio, 2014)

Hansen (2012) however, brings in a humanistic approach to his reference to the economic stimulation of taxing carbon emissions as he relates the information back to the people directly affected—a different approach than the other two speeches. “This fee and dividend would stimulate the economy and innovations, creating millions of jobs. It is the principal requirement for moving us rapidly to a clean energy future.” The use as economics as instrumental rationality in this example does justify the end with a value placed on people rather than power industries, government, money, and politics. Hansen’s mentions and relies on economics and instrumental calculations more sparingly in his speech, than DiCaprio and Gore.

**Report talk critique.** Tone and complexity of the three speeches was analyzed through CDA methodology to provide a sense of the material used to communicate climate change. Rapport talk allows the speaker to connect with the audience (Tannen, 1989). This is also something more associated with the female gendered communication, thus this section
showcases another way in which the female voice—or style of communicating—is not part of the equation. Report talk, done primarily by the male gender, illustrates how much knowledge one has on the subject and does not work toward garnering a connection with its audience (1989)

The tone and type of language used elicit aspects of detailed science information in the speeches of Gore and Hansen, information that is not relatable for the average, non-scientific citizen and more identifiable with the male gender based on report talk (Tannen, 1989). This illustrates the prevalence of report (as opposed to the female style of rapport) talk:

• Let me show you these slides here. I thought I would start with the logo. What's missing here, of course, is the North Polar ice cap. Greenland remains. Twenty-eight years ago, this is what the polar ice cap -- the North Polar ice cap -- looked like at the end of the summer, at the fall equinox. This last fall, I went to the Snow and Ice Data Center in Boulder, Colorado, and talked to the researchers here in Monterey at the Naval Postgraduate Laboratory. This is what's happened in the last 28 years. To put it in perspective, 2005 was the previous record. Here's what happened last fall that has really unnerved the researchers. The North Polar ice cap is the same size geographically -- doesn't look quite the same size -- but it is exactly the same size as the United States, minus an area roughly equal to the state of Arizona. The amount that disappeared in 2005 was equivalent to everything east of the Mississippi. The extra amount that disappeared last fall was equivalent to this much. It comes back in the winter, but not as permanent ice, as thin ice -- vulnerable. The amount remaining could be completely gone in summer in as little as five years. That puts a lot of pressure on Greenland.

Already, around the Arctic Circle -- this is a famous village in Alaska. This is a
town in Newfoundland. Antarctica. Latest studies from NASA. The amount of a moderate-to-severe snow melting of an area equivalent to the size of California. (Gore, 2008)

- And I was really lucky to go to the University of Iowa where I could study under Professor James Van Allen who built instruments for the first U.S. satellites. Professor Van Allen told me about observations of Venus, that there was intense microwave radiation. Did it mean that Venus had an ionosphere? Or was Venus extremely hot? The right answer, confirmed by the Soviet Venera spacecraft, was that Venus was very hot -- 900 degrees Fahrenheit. And it was kept hot by a thick carbon dioxide atmosphere. (Hansen, 2012)

- Now finally, we can measure Earth's energy imbalance precisely by measuring the heat content in Earth's heat reservoirs. The biggest reservoir, the ocean, was the least well measured, until more than 3,000 Argo floats were distributed around the world's ocean. These floats reveal that the upper half of the ocean is gaining heat at a substantial rate. The deep ocean is also gaining heat at a smaller rate, and energy is going into the net melting of ice all around the planet. And the land, to depths of tens of meters, is also warming. (Hansen, 2012)

- Now consider Earth's climate history. These curves for global temperature, atmospheric CO2 and sea level were derived from ocean cores and Antarctic ice cores, from ocean sediments and snowflakes that piled up year after year over 800,000 years forming a two-mile thick ice sheet. As you see, there's a high correlation between temperature, CO2 and sea level. Careful examination shows that the temperature changes slightly lead the CO2 changes by a few centuries.
Climate change deniers like to use this fact to confuse and trick the public by saying, "Look, the temperature causes CO2 to change, not vice versa." But that lag is exactly what is expected. (Hansen, 2012)

- The important point is that these same amplifying feedbacks will occur today. The physics does not change. As Earth warms, now because of extra CO2 we put in the atmosphere, ice will melt, and CO2 and methane will be released by warming ocean and melting permafrost. While we can't say exactly how fast these amplifying feedbacks will occur, it is certain they will occur, unless we stop the warming. There is evidence that feedbacks are already beginning. Precise measurements by GRACE, the gravity satellite, reveal that both Greenland and Antarctica are now losing mass, several hundred cubic kilometers per year. And the rate has accelerated since the measurements began nine years ago. Methane is also beginning to escape from the permafrost. (Hansen, 2012)

While both Gore (2008) and Hansen (2012) had glimpses of rapport talk (Tannen, 1990), neither focused any amount of attention to building a connection or dialogue with their audiences to hone in on the important information they were delivering in a way that could better inform those listening. Hansen’s speech was primarily report talk that the average person without a science background would struggle to follow. Language that is science-heavy and over the heads of those in the audience does little to elicit support for the cause (Bailey, et al., 2014). Hansen would better serve the cause if the information he presents is related to everyday life, addressing the people it affects or the species damaged by climate change.

Gore, DiCaprio, and Hansen stand apart from the society they speak on the behalf of and speak on a level that is simply not relatable. Their perspective also continues a legacy of the
science fields which alienates rapport talk, which is considered to be the female style of communicating.

Jill Stein ("Jill Stein: We Must Deal With The Climate Crisis Through Job Creation," 2015), leader of the Green Party uses rapport talk to relay information on climate change:

It sort of takes a certain kind of denial to fail to see how they're connected, because the planet provides us food and water and jobs and the basis of industry. If we destroy the planet, we don't have jobs, basically. We also don't have food. The price of food is skyrocketing right now because of the drought in California, which produces half of the fruits and vegetables for the country. You know, on the other hand, if we don't take care of people, then we're not going to have a planet.

Stein brings together people, the planet, and the severity of the issue in a way that people can grasp onto and feel part of the action to reverse the ill effects of climate change. Stein’s style of communicating echoes that of ecofeminism, where the female gender has a natural relationship with the environment in contrast to illustrating the story of climate change through economics, military action, and government control.

Discussion

The frames found within the context of the three speeches, patriarchal reinforcement of the gendered military symbolism, instrumental rationality as a mode of gendered communication, and report talk critique, reflect ways gendered discourse continues throughout the field of science and in everyday language—either consciously or subconsciously. This research (RQ. 1) sought to categorize gendered words and phrases used by climate change communicators as way to heighten awareness to the issue and find compelling arguments toward finding more gender-neutral terms.
The feminist standpoint theory, as used within this study, suggests that knowledge is situated from the place people, male, female, or somewhere in-between, frame their worldviews (Bee, 2013; Harding, 1986). This view can be produced or altered by hierarchies of power communicated through speeches like those analyzed for climate change discourse. “Gender politics has provided resources for the advancement of science, and science has provided resources for the advancement of masculine domination” (Harding, 1986, p. 112). Harding explains how modern science, as exemplified in all three climate change speeches, is deeply intertwined in politics which created the social construction of gender. Through language, climate change discourse is driven by politics and economics and devoid of sentiments of care, linking its affects to those who will lose jobs, families, and their lives to its destruction. Military symbolism shapes and frames its discourse to reinforce patriarchal lines and provide metaphors entrenched in gendered communication.

Conversely, there is a more natural connection with the planet, as conveyed through ecofeminism (Mies & Shiva, 2014. Ecofeminism denotes the voice not heard as often in established climate change rhetoric and serves as a direct counterpoint to the gendered terms exemplified within this research (RQ. 1). Additionally, Jill Stein of the Green Party illustrates that this style of communicating can be done:

So most people get that our welfare, our survival depends not only on jobs and jobs at good wages, but it also depends on having a stable and healthy environment. And right now we have a system which is essentially exploiting both our natural resources and our human resources. ("Jill Stein: We Must Deal With The Climate Crisis Through Job Creation," 2015)
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Namely, this discourse would share reasoning for bringing in the female voice to the discussion—this inclusion would illustrate the connection between the land and the women, or people. Land and its destruction via climate change would not be talked about as a conquest to end through militaries and governments. A pathway to communicating the necessity of a healthy planet to its inhabitants is through relating to the land, nurturing it, and sharing those stories behind the significance of climate change’s trajectory on its longevity.

The language used to describe climate change in the three speeches analyzed insert the patriarchal, male-dominated language that is modern science. Instances of gendered words and phrases from predominant public figures communicating to the general public about climate change was affirmed through this study. Data that is concerned soft, subjective, or emotional (Harding, 1986) is stricken from these climate change communicators that would make the information more relatable and allow more people to become part of the outreach effort.
Chapter 5: Summaries And Conclusions

Limitations of the Study

This study was grounded in the feminist standpoint theory, backed by a wealth of previous studies and works pinpointed in the literature review. Three speeches were identified for analysis based on the speaker’s popularity with mass media audiences and there being a high likelihood that others have either heard from one of the speakers or that their language influences views of climate change. More studies could have been analyzed here by the same speakers to denote a pattern of gendered communication or through the voices of other speakers to provide more examples. Additionally, it should be noted that the three speakers were all English-speaking, white American males. Subsequent research might examine if gender, race, or socio-economic factors change the discourse. There is also a lack of standardized language of what is gendered and what is not. This methodology used, CDA, leaves the identification of gendered language to interpretation and examples provided by theorists and researchers.

Recommendations for Future Study

This research brought further evidence regarding the male bias of discourse presented in the fields of science and in the public arena. By providing examples of popular figures commenting on a highly volatile subject that is only increasing in the importance, additional platforms where communication is gendered have been revealed. What should continue to be studied, however, are the implications set forth by this information. Reception studies identifying to what extent different populations respond to gendered communication that aids in the believability or deniability of climate change as fact should be explored. Additionally, what steps can be made to bring about gender-neutral language for all fields of study and industries?
Conclusions

This research answered the question of what terms and phrases used illustrate gendered communication using the theoretical framework of the feminist standpoint theory. Through the use of frames and analysis conducted with CDA, texts within the three chosen speeches on climate change followed the philosophical assumption that through the social construct of gender, the female voice separates itself and becomes overpowered by the dominance of the male voice (Gilligan, 1982; "Carol Gilligan," n.d.). Leading climate change communicators on three different platforms confirm gendered language is used to discuss the severity of climate change and its effect on the population, or rather the effect it will have on governments and political arenas.

The major frames identified and confirmed through discourse analysis of the speeches, patriarchal reinforcement of the gendered military symbolism, instrumental rationality as a mode of gendered communication, and report talk critique, illustrate Harding (1986) and Cohn’s (1987) depictions of gendered language and science. Patriarchy lineages are shown to be reinforcement through the use of military metaphors and symbolism of government and politics. Specialized language (1970) like “mobilize resources” and “security threats” garners images of military, power, and conquest. Limiting the full scope of climate change effects to be that of economic and monetary hardships, without also acknowledging the personal loss its effects bring about, illustrates instrumental rationality and further gendering of the discourse. Muting an emotional connection when discussing climate change to mass audiences exemplifies report talk, where knowledge is touted. Each frame separates the message from the inclusion of all genders from the conversation.
These gendered frameworks of climate change communication ramify into the way people hear much-needed information about climate change and how they will in turn form their opinions on its believability. It also effects how citizens feel connected to the concept and if they will become part of the solution. As it stands from the speeches analyzed, it is the job of male-dominated entities to save the planet and population.

Research has shown that language, from its inception, has a gender bias (Boroditsky, 2009; Haraway, 1998; Prewitt-Freilino, et al., 2012). Using this knowledge and understanding of how that bias changes worldviews can offer ways to alter that course toward a more neutral standpoint where the voice, ideas, and concerns of all are brought forward and given a platform. From the collection of data to the communication sent out to the public, the gendering of language, fields of study, and of industries fails to offer a rounded outlook of the world. The evidence of climate change continues to reveal itself, How will we continue to view it, receive the information, and become part of the conversation? As a woman who now sees the gendered aspects of language, fields of study, critical issues like climate change, and systems of power, I feel hopeful that the patriarchal lineages will not last in separating the female voice from making lasting strides in the inclusion of all genders.
References


CLIMATE CHANGE DISCOURSE AS GENDERED COMMUNICATION


CLIMATE CHANGE DISCOURSE AS GENDERED COMMUNICATION


[Audio Begins]

FEMALE: Please welcome newly appointed United Nations Messenger of Peace, Mr. Leonardo DiCaprio.

DICAPRIO: Thank you Mr. Secretary General, Your Excellencies, ladies and gentlemen and distinguished guests. I am honored to be here today. I stand before you not as an expert, but as a concerned citizen, one of the four hundred thousand people who marched in the streets of New York on Sunday, and the billions of others around the world who want to solve our climate crisis. As an actor, I pretend for a living. I play fictitious characters often solving fictitious problems. I believe that mankind has looked at climate change in that same way, as if it were a fiction. As if pretending that climate change wasn’t real would somehow make it go away. But I think we all know better than that now.

Every week we’re seeing new and undeniable climate events, evidence that accelerated climate change is here right now. Droughts are intensifying; our oceans are acidifying, with methane plumes rising up from the ocean floor. We are seeing extreme weather events, and the west Antarctic and Greenland ice sheets melting at unprecedented rates, decades ahead of scientific projections. None of this is rhetoric, and none of it is hysteria. It is fact. The scientific community knows it, industry knows it, governments know it, even the United States military knows it. The Chief of the U.S. Navy’s Pacific Command, Admiral Samuel Locklear recently said that climate change is our single greatest security threat.
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My friends, this body, perhaps more than any other gathering in human history, now faces this difficult but achievable task. You can make history, or you will be vilified by it. To be clear, this is not about just telling people to change their lightbulbs or to buy a hybrid car. This disaster has grown beyond the choices that individuals make. This is now about our industries and our governments around the world taking decisive, large scale action. Now must be our moment for action. We need to put a price tag on carbon emissions and eliminate government subsidies for oil, coal and gas companies. We need to end the free ride that industrial polluters have been given in the name of a free market economy. They do not deserve our tax dollars. They deserve our scrutiny. For the economy itself will die if our ecosystems collapse.

The good news is that renewable energy is not only achievable, but good economic policy. This is not a partisan debate, it is a human one. Clean air and a livable climate are inalienable human rights. And solving this crisis is not a question of politics, it is a question of our own survival. This is the most urgent of times, and the most urgent of messages. Honored delegates, leaders of the world, I pretend for a living, but you do not. The people made their voices heard on Sunday around the world, and the momentum will not stop. But now it is your turn. The time to answer humankind’s greatest challenge is now. We beg of you to face it with courage and honesty. Thank you.

[Audio Ends]
I have given the slide show that I gave here two years ago about 2,000 times. I'm giving a short slide show this morning that I'm giving for the very first time, so -- well it's -- I don't want or need to raise the bar, I'm actually trying to lower the bar. Because I've cobbled this together to try to meet the challenge of this session.

And I was reminded by Karen Armstrong's fantastic presentation that religion really properly understood is not about belief, but about behavior. Perhaps we should say the same thing about optimism. How dare we be optimistic? Optimism is sometimes characterized as a belief, an intellectual posture. As Mahatma Gandhi famously said, "You must become the change you wish to see in the world." And the outcome about which we wish to be optimistic is not going to be created by the belief alone, except to the extent that the belief brings about new behavior. But the word "behavior" is also, I think, sometimes misunderstood in this context. I'm a big advocate of changing the lightbulbs and buying hybrids, and Tipper and I put 33 solar panels on our house, and dug the geothermal wells, and did all of that other stuff. But, as important as it is to change the lightbulbs, it is more important to change the laws. And when we change our behavior in our daily lives, we sometimes leave out the citizenship part and the democracy part. In order to be optimistic about this, we have to become incredibly active as citizens in our democracy. In order to solve the climate crisis, we have to solve the democracy crisis. And we have one.
2:30 I have been trying to tell this story for a long time. I was reminded of that recently, by a woman who walked past the table I was sitting at, just staring at me as she walked past. She was in her 70s, looked like she had a kind face. I thought nothing of it until I saw from the corner of my eye she was walking from the opposite direction, also just staring at me. And so I said, "How do you do?" And she said, "You know, if you dyed your hair black, you would look just like Al Gore." (Laughter)

3:12 Many years ago, when I was a young congressman, I spent an awful lot of time dealing with the challenge of nuclear arms control -- the nuclear arms race. And the military historians taught me, during that quest, that military conflicts are typically put into three categories: local battles, regional or theater wars, and the rare but all-important global, world war -- strategic conflicts. And each level of conflict requires a different allocation of resources, a different approach, a different organizational model. Environmental challenges fall into the same three categories, and most of what we think about are local environmental problems: air pollution, water pollution, hazardous waste dumps. But there are also regional environmental problems, like acid rain from the Midwest to the Northeast, and from Western Europe to the Arctic, and from the Midwest out the Mississippi into the dead zone of the Gulf of Mexico. And there are lots of those. But the climate crisis is the rare but all-important global, or strategic, conflict. Everything is affected. And we have to organize our response appropriately. We need a worldwide, global mobilization for renewable energy, conservation, efficiency and a global transition to a low-carbon economy. We have work to do. And we can mobilize resources and political will. But the political will has to be mobilized, in order to mobilize the resources.

4:56 Let me show you these slides here. I thought I would start with the logo. What's missing here, of course, is the North Polar ice cap. Greenland remains. Twenty-eight years ago, this is
what the polar ice cap -- the North Polar ice cap -- looked like at the end of the summer, at the
fall equinox. This last fall, I went to the Snow and Ice Data Center in Boulder, Colorado, and
talked to the researchers here in Monterey at the Naval Postgraduate Laboratory. This is what's
happened in the last 28 years. To put it in perspective, 2005 was the previous record. Here's what
happened last fall that has really unnerved the researchers. The North Polar ice cap is the same
size geographically -- doesn't look quite the same size -- but it is exactly the same size as the
United States, minus an area roughly equal to the state of Arizona. The amount that disappeared
in 2005 was equivalent to everything east of the Mississippi. The extra amount that disappeared
last fall was equivalent to this much. It comes back in the winter, but not as permanent ice, as
thin ice -- vulnerable. The amount remaining could be completely gone in summer in as little as
five years. That puts a lot of pressure on Greenland. Already, around the Arctic Circle -- this is a
famous village in Alaska. This is a town in Newfoundland. Antarctica. Latest studies from
NASA. The amount of a moderate-to-severe snow melting of an area equivalent to the size of
California.

7:10 "They were the best of times, they were the worst of times": the most famous opening
sentence in English literature. I want to share briefly a tale of two planets. Earth and Venus are
exactly the same size. Earth's diameter is about 400 kilometers larger, but essentially the same
size. They have exactly the same amount of carbon. But the difference is, on Earth, most of the
carbon has been leeched over time out of the atmosphere, deposited in the ground as coal, oil,
natural gas, etc. On Venus, most of it is in the atmosphere. The difference is that our temperature
is 59 degrees on average. On Venus, it's 855. This is relevant to our current strategy of taking as
much carbon out of the ground as quickly as possible, and putting it into the atmosphere. It's not
because Venus is slightly closer to the Sun. It's three times hotter than Mercury, which is right
next to the Sun. Now, briefly, here's an image you've seen, as one of the only old images, but I show it because I want to briefly give you CSI: Climate.

8:19 The global scientific community says: man-made global warming pollution, put into the atmosphere, thickening this, is trapping more of the outgoing infrared. You all know that. At the last IPCC summary, the scientists wanted to say, "How certain are you?" They wanted to answer that "99 percent." The Chinese objected, and so the compromise was "more than 90 percent."

Now, the skeptics say, "Oh, wait a minute, this could be variations in this energy coming in from the sun." If that were true, the stratosphere would be heated as well as the lower atmosphere, if it's more coming in. If it's more being trapped on the way out, then you would expect it to be warmer here and cooler here. Here is the lower atmosphere. Here's the stratosphere: cooler. CSI: Climate.

9:13 Now, here's the good news. Sixty-eight percent of Americans now believe that human activity is responsible for global warming. Sixty-nine percent believe that the Earth is heating up in a significant way. There has been progress, but here is the key: when given a list of challenges to confront, global warming is still listed at near the bottom. What is missing is a sense of urgency. If you agree with the factual analysis, but you don't feel the sense of urgency, where does that leave you? Well, the Alliance for Climate Protection, which I head in conjunction with Current TV -- who did this pro bono -- did a worldwide contest to do commercials on how to communicate this. This is the winner.

10:59 NBC -- I'll show all of the networks here -- the top journalists for NBC asked 956 questions in 2007 of the presidential candidates: two of them were about the climate crisis. ABC: 844 questions, two about the climate crisis. Fox: two. CNN: two. CBS: zero. From laughs to tears -- this is one of the older tobacco commercials. So here's what we're doing. This is gasoline
consumption in all of these countries. And us. But it's not just the developed nations. The
developing countries are now following us and accelerating their pace. And actually, their
cumulative emissions this year are the equivalent to where we were in 1965. And they're
catching up very dramatically. The total concentrations: by 2025, they will be essentially where
we were in 1985. If the wealthy countries were completely missing from the picture, we would
still have this crisis. But we have given to the developing countries the technologies and the
ways of thinking that are creating the crisis. This is in Bolivia -- over thirty years.
12:58 This is peak fishing in a few seconds. The '60s. '70s. '80s. '90s. We have to stop this. And
the good news is that we can. We have the technologies. We have to have a unified view of how
to go about this: the struggle against poverty in the world and the challenge of cutting wealthy
country emissions, all has a single, very simple solution.
13:32 People say, "What's the solution?" Here it is. Put a price on carbon. We need a CO2 tax,
revenue neutral, to replace taxation on employment, which was invented by Bismarck -- and
some things have changed since the 19th century. In the poor world, we have to integrate the
responses to poverty with the solutions to the climate crisis. Plans to fight poverty in Uganda are
mooted, if we do not solve the climate crisis.
14:10 But responses can actually make a huge difference in the poor countries. This is a proposal
that has been talked about a lot in Europe. This was from Nature magazine. These are
concentrating solar, renewable energy plants, linked in a so-called "supergrid" to supply all of
the electrical power to Europe, largely from developing countries -- high-voltage DC currents.
This is not pie in the sky; this can be done.
14:52 We need to do it for our own economy. The latest figures show that the old model is not
working. There are a lot of great investments that you can make. If you are investing in tar sands
or shale oil, then you have a portfolio that is crammed with sub-prime carbon assets. And it is based on an old model. Junkies find veins in their toes when the ones in their arms and their legs collapse. Developing tar sands and coal shale is the equivalent. Here are just a few of the investments that I personally think make sense. I have a stake in these, so I'll have a disclaimer there. But geothermal, concentrating solar, advanced photovoltaics, efficiency and conservation.

15:50 You've seen this slide before, but there's a change. The only two countries that didn't ratify -- and now there's only one. Australia had an election. And there was a campaign in Australia that involved television and Internet and radio commercials to lift the sense of urgency for the people there. And we trained 250 people to give the slide show in every town and village and city in Australia. Lot of other things contributed to it, but the new Prime Minister announced that his very first priority would be to change Australia's position on Kyoto, and he has. Now, they came to an awareness partly because of the horrible drought that they have had. This is Lake Lanier. My friend Heidi Cullen said that if we gave droughts names the way we give hurricanes names, we'd call the one in the southeast now Katrina, and we would say it's headed toward Atlanta. We can't wait for the kind of drought Australia had to change our political culture.

Here's more good news. The cities supporting Kyoto in the U.S. are up to 780 -- and I thought I saw one go by there, just to localize this -- which is good news.

17:16 Now, to close, we heard a couple of days ago about the value of making individual heroism so commonplace that it becomes banal or routine. What we need is another hero generation. Those of us who are alive in the United States of America today especially, but also the rest of the world, have to somehow understand that history has presented us with a choice -- just as Jill [Bolte] Taylor was figuring out how to save her life while she was distracted by the amazing experience that she was going through. We now have a culture of distraction. But we
have a planetary emergency. And we have to find a way to create, in the generation of those alive today, a sense of generational mission. I wish I could find the words to convey this. This was another hero generation that brought democracy to the planet. Another that ended slavery. And that gave women the right to vote. We can do this. Don't tell me that we don't have the capacity to do it. If we had just one week's worth of what we spend on the Iraq War, we could be well on the way to solving this challenge. We have the capacity to do it.

19:12 One final point: I'm optimistic, because I believe we have the capacity, at moments of great challenge, to set aside the causes of distraction and rise to the challenge that history is presenting to us. Sometimes I hear people respond to the disturbing facts of the climate crisis by saying, "Oh, this is so terrible. What a burden we have." I would like to ask you to reframe that. How many generations in all of human history have had the opportunity to rise to a challenge that is worthy of our best efforts? A challenge that can pull from us more than we knew we could do? I think we ought to approach this challenge with a sense of profound joy and gratitude that we are the generation about which, a thousand years from now, philharmonic orchestras and poets and singers will celebrate by saying, they were the ones that found it within themselves to solve this crisis and lay the basis for a bright and optimistic human future.

21:08 Let's do that. Thank you very much.
What do I know that would cause me, a reticent, Midwestern scientist, to get myself arrested in front of the White House protesting? And what would you do if you knew what I know? Let's start with how I got to this point. I was lucky to grow up at a time when it was not difficult for the child of a tenant farmer to make his way to the state university.

And I was really lucky to go to the University of Iowa where I could study under Professor James Van Allen who built instruments for the first U.S. satellites. Professor Van Allen told me about observations of Venus, that there was intense microwave radiation. Did it mean that Venus had an ionosphere? Or was Venus extremely hot? The right answer, confirmed by the Soviet Venera spacecraft, was that Venus was very hot -- 900 degrees Fahrenheit. And it was kept hot by a thick carbon dioxide atmosphere.

I was fortunate to join NASA and successfully propose an experiment to fly to Venus. Our instrument took this image of the veil of Venus, which turned out to be a smog of sulfuric acid. But while our instrument was being built, I became involved in calculations of the greenhouse effect here on Earth, because we realized that our atmospheric composition was changing. Eventually, I resigned as principal investigator on our Venus experiment because a planet changing before our eyes is more interesting and important. Its changes will affect all of humanity.

The greenhouse effect had been well understood for more than a century. British physicist John Tyndall, in the 1850's, made laboratory measurements of the infrared radiation, which is
heat. And he showed that gasses such as CO2 absorb heat, thus acting like a blanket warming Earth's surface.

2:28 I worked with other scientists to analyze Earth climate observations. In 1981, we published an article in Science magazine concluding that observed warming of 0.4 degrees Celsius in the prior century was consistent with the greenhouse effect of increasing CO2. That Earth would likely warm in the 1980's, and warming would exceed the noise level of random weather by the end of the century. We also said that the 21st century would see shifting climate zones, creation of drought-prone regions in North America and Asia, erosion of ice sheets, rising sea levels and opening of the fabled Northwest Passage. All of these impacts have since either happened or are now well under way.

3:19 That paper was reported on the front page of the New York Times and led to me testifying to Congress in the 1980's, testimony in which I emphasized that global warming increases both extremes of the Earth's water cycle. Heatwaves and droughts on one hand, directly from the warming, but also, because a warmer atmosphere holds more water vapor with its latent energy, rainfall will become in more extreme events. There will be stronger storms and greater flooding. Global warming hoopla became time-consuming and distracted me from doing science -- partly because I had complained that the White House altered my testimony. So I decided to go back to strictly doing science and leave the communication to others.

4:13 By 15 years later, evidence of global warming was much stronger. Most of the things mentioned in our 1981 paper were facts. I had the privilege to speak twice to the president's climate task force. But energy policies continued to focus on finding more fossil fuels. By then we had two grandchildren, Sophie and Connor. I decided that I did not want them in the future to
say, "Opa understood what was happening, but he didn't make it clear." So I decided to give a public talk criticizing the lack of an appropriate energy policy.

4:54 I gave the talk at the University of Iowa in 2004 and at the 2005 meeting of the American Geophysical Union. This led to calls from the White House to NASA headquarters and I was told that I could not give any talks or speak with the media without prior explicit approval by NASA headquarters. After I informed the New York Times about these restrictions, NASA was forced to end the censorship. But there were consequences. I had been using the first line of the NASA mission statement, "To understand and protect the home planet," to justify my talks. Soon the first line of the mission statement was deleted, never to appear again.

5:40 Over the next few years I was drawn more and more into trying to communicate the urgency of a change in energy policies, while still researching the physics of climate change. Let me describe the most important conclusion from the physics -- first, from Earth's energy balance and, second, from Earth's climate history.

6:03 Adding CO2 to the air is like throwing another blanket on the bed. It reduces Earth's heat radiation to space, so there's a temporary energy imbalance. More energy is coming in than going out, until Earth warms up enough to again radiate to space as much energy as it absorbs from the Sun. So the key quantity is Earth's energy imbalance. Is there more energy coming in than going out? If so, more warming is in the pipeline. It will occur without adding any more greenhouse gasses.

6:40 Now finally, we can measure Earth's energy imbalance precisely by measuring the heat content in Earth's heat reservoirs. The biggest reservoir, the ocean, was the least well measured, until more than 3,000 Argo floats were distributed around the world's ocean. These
floats reveal that the upper half of the ocean is gaining heat at a substantial rate. The deep ocean is also gaining heat at a smaller rate, and energy is going into the net melting of ice all around the planet. And the land, to depths of tens of meters, is also warming.

7:20 The total energy imbalance now is about six-tenths of a watt per square meter. That may not sound like much, but when added up over the whole world, it's enormous. It's about 20 times greater than the rate of energy use by all of humanity. It's equivalent to exploding 400,000 Hiroshima atomic bombs per day 365 days per year. That's how much extra energy Earth is gaining each day. This imbalance, if we want to stabilize climate, means that we must reduce CO2 from 391 ppm, parts per million, back to 350 pm. That is the change needed to restore energy balance and prevent further warming.

8:11 Climate change deniers argue that the Sun is the main cause of climate change. But the measured energy imbalance occurred during the deepest solar minimum in the record, when the Sun's energy reaching Earth was least. Yet, there was more energy coming in than going out. This shows that the effect of the Sun's variations on climate is overwhelmed by the increasing greenhouse gasses, mainly from burning fossil fuels.

8:40 Now consider Earth's climate history. These curves for global temperature, atmospheric CO2 and sea level were derived from ocean cores and Antarctic ice cores, from ocean sediments and snowflakes that piled up year after year over 800,000 years forming a two-mile thick ice sheet. As you see, there's a high correlation between temperature, CO2 and sea level. Careful examination shows that the temperature changes slightly lead the CO2 changes by a few centuries. Climate change deniers like to use this fact to confuse and trick the public by saying,
"Look, the temperature causes CO2 to change, not vice versa. "But that lag is exactly what is expected.

9:31 Small changes in Earth's orbit that occur over tens to hundreds of thousands of years alter the distribution of sunlight on Earth. When there is more sunlight at high latitudes in summer, ice sheets melt. Shrinking ice sheets make the planet darker, so it absorbs more sunlight and becomes warmer. A warmer ocean releases CO2, just as a warm Coca-Cola does. And more CO2 causes more warming. So CO2, methane, and ice sheets were feedbacks that amplified global temperature change causing these ancient climate oscillations to be huge, even though the climate change was initiated by a very weak forcing.

10:18 The important point is that these same amplifying feedbacks will occur today. The physics does not change. As Earth warms, now because of extra CO2 we put in the atmosphere, ice will melt, and CO2 and methane will be released by warming ocean and melting permafrost. While we can't say exactly how fast these amplifying feedbacks will occur, it is certain they will occur, unless we stop the warming. There is evidence that feedbacks are already beginning. Precise measurements by GRACE, the gravity satellite, reveal that both Greenland and Antarctica are now losing mass, several hundred cubic kilometers per year. And the rate has accelerated since the measurements began nine years ago. Methane is also beginning to escape from the permafrost.

11:17 What sea level rise can we look forward to? The last time CO2 was 390 ppm, today's value, sea level was higher by at least 15 meters, 50 feet. Where you are sitting now would be under water. Most estimates are that, this century, we will get at least one meter. I think it will be
more if we keep burning fossil fuels, perhaps even five meters, which is 18 feet, this century or shortly thereafter.

11:50 The important point is that we will have started a process that is out of humanity's control. Ice sheets would continue to disintegrate for centuries. There would be no stable shoreline. The economic consequences are almost unthinkable. Hundreds of New Orleans-like devastations around the world. What may be more reprehensible, if climate denial continues, is extermination of species. The monarch butterfly could be one of the 20 to 50 percent of all species that the Intergovernmental Panel on Climate Change estimates will be ticketed for extinction by the end of the century if we stay on business-as-usual fossil fuel use.

12:36 Global warming is already affecting people. The Texas, Oklahoma, Mexico heatwave and drought last year, Moscow the year before and Europe in 2003, were all exceptional events, more than three standard deviations outside the norm. Fifty years ago, such anomalies covered only two- to three-tenths of one percent of the land area. In recent years, because of global warming, they now cover about 10 percent --an increase by a factor of 25 to 50. So we can say with a high degree of confidence that the severe Texas and Moscow heatwaves were not natural; they were caused by global warming. An important impact, if global warming continues, will be on the breadbasket of our nation and the world, the Midwest and Great Plains, which are expected to become prone to extreme droughts, worse than the Dust Bowl, within just a few decades, if we let global warming continue.

13:42 How did I get dragged deeper and deeper into an attempt to communicate, giving talks in 10 countries, getting arrested, burning up the vacation time that I had accumulated over 30 years? More grandchildren helped me along. Jake is a super-positive, enthusiastic boy. Here at
age two and a half years, he thinks he can protect his two and a half-day-old little sister. It would be immoral to leave these young people with a climate system spiraling out of control.

14:19 Now the tragedy about climate change is that we can solve it with a simple, honest approach of a gradually rising carbon fee collected from fossil fuel companies and distributed 100 percent electronically every month to all legal residents on a per capita basis, with the government not keeping one dime. Most people would get more in the monthly dividend than they'd pay in increased prices. This fee and dividend would stimulate the economy and innovations, creating millions of jobs. It is the principal requirement for moving us rapidly to a clean energy future.

15:03 Several top economists are coauthors on this proposition. Jim DiPeso of Republicans for Environmental Protection describes it thusly: "Transparent. Market-based. Does not enlarge government. Leaves energy decisions to individual choices. Sounds like a conservative climate plan."

15:24 But instead of placing a rising fee on carbon emissions to make fossil fuels pay their true cost to society, our governments are forcing the public to subsidize fossil fuels by 400 to 500 billion dollars per year worldwide, thus encouraging extraction of every fossil fuel -- mountaintop removal, longwall mining, fracking, tar sands, tar shale, deep ocean Arctic drilling. This path, if continued, guarantees that we will pass tipping points leading to ice sheet disintegration that will accelerate out of control of future generations. A large fraction of species will be committed to extinction. And increasing intensity of droughts and floods will severely impact breadbaskets of the world, causing massive famines and economic decline. Imagine a giant asteroid on a direct collision course with Earth.
16:29 That is the equivalent of what we face now. Yet, we dither, taking no action to divert the asteroid, even though the longer we wait, the more difficult and expensive it becomes. If we had started in 2005, it would have required emission reductions of three percent per year to restore planetary energy balance and stabilize climate this century. If we start next year, it is six percent per year. If we wait 10 years, it is 15 percent per year -- extremely difficult and expensive, perhaps impossible. But we aren't even starting.

17:10 So now you know what I know that is moving me to sound this alarm. Clearly, I haven't gotten this message across. The science is clear. I need your help to communicate the gravity and the urgency of this situation and its solutions more effectively. We owe it to our children and grandchildren.

17:34 Thank you.

17:36 (Applause)