A Tangible Point of Reference:

How to transform the obstructive public attitude towards climate change in the United States?

Chad Stephen Boda

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A thesis submitted in partial fulfillment of the requirements of Lund University International Master's Programme in Environmental Studies and Sustainability Science (30hp/credits)

LUCSUS
Lund University Centre for Sustainability Studies

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Submitted May 15, 2012

Supervisor: Turaj Faran, LUCSUS, Lund University

Abstract:

The scientific consensus on climate change is clear, but the social consensus in the United States has yet to concur. Mainstream explanations for the failure of the American public to engage the climate change problem often refer to an information deficit or lacking political will, but have not proven sufficient in accounting for such behavior. A deeper look reveals that the problem lies at the socio-cultural level, where an obstructive cultural-hegemony influences American civil society's engagement with climate change and maintains the undesirable status quo. Understanding how and when it may be possible to overcome this hegemony is essential for developing increased social support for addressing climate change. Utilizing a neo-Gramscian approach, and combining contributions from a substantial literature review, critical realism, and evidence from the field, I suggest that climate-related disasters may prove extremely effective in calling into question this obstructive cultural-hegemony and may provide opportunities for bridging the social and scientific divide. However, experience alone is not enough, and relevant and credible intervention may prove crucial in achieving a convergence of the social and scientific perspectives. These conclusions highlight the need for context specific strategies in climate change activism and further support the call for transdisciplinarity in problem-driven and action-oriented research fields like Sustainability Science.

Key Words: Climate Change, Sustainability Science, Neo-Gramsianism, Critical Realism, Climate-related Disaster, Intervention

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Table of Contents

List of Figures:

"*It is the evident fallibility of our knowledge-*
the experience of getting things wrong,
of having expectations confounded,
and of crashing into things-
that justifies us in believing that the world
exists regardless of what we happen to
think about it"

-Andrew Sayer

Preface:

We live in an incredibly diverse and amazing world, but challenges to sustainability, both old and new, plague our collective conscience and beg for prompt and effective solutions. Resolutions to these challenges are preceded by social support for action, something all-too-often lacking. Understanding the barriers to such support is pivotal if strategic solutions are to be developed and implemented that stand any chance of successfully re-directing society along a sustainable path. In this thesis, grounded in the trans-disciplinary field of Sustainability Science, I take a neo-Gramscian approach to investigating the barriers to and opportunities for action on global climate change, one of the most interconnected and often seriously neglected sustainability challenges facing the world today. I discuss this issue from the perspective of one of the world's most notorious climate change cynics, the United States of America.

The scientific consensus on climate change is clear, yet the social consensus in the United States has yet to concur. Mainstream explanations for the failure of the American public to engage the climate change problem often refer to an information deficit or lacking political will, but these have not proven sufficient in accounting for such behavior. A deeper look reveals the problem lies at the socio-cultural level, where an obstructive hegemonic world-view strongly influences American civil society's perceptions of and engagement with climate change. The unfolding narratives of global climate change and civil society in the United States are not mutually exclusive, and solving the first surely implies addressing (and perhaps transforming) the later. Through my research, I mingle these ongoing stories by constructing an analytical narrative that lays out the scientific reality of global climate change as well as its socio-cultural and political context in the United States in search of opportunities for effective intervention and the potential transformation of the obstructive cultural-hegemony itself.

The combination of a substantial literature review, contributions from critical realism, and evidence from the field lead me to suggest that climate-related disasters, by confounding individual's expectations, may prove extremely effective in calling into question the cultural-hegemonic climate change perspective and may provide opportunities for closing the social and scientific divide. However, experience alone is not enough, and relevant, credible, and context specific intervention may prove crucial in achieving a convergence of these social and scientific perspectives. The findings in this thesis both provide actionable knowledge for climate change activists and further support the call for trans-disciplinarity in problem-driven and action-oriented academic research fields like that of Sustainability Science as a means to more effectively bridging the gap between science and civil society.

1. The Anthropocene, Climate Change, and Sustainability Science:

1.1 A New Human-Environment Relationship:

> "A profound transformation of Earth's environment is now apparent, owing not to the great forces of nature or to extraterrestrial sources but to the numbers and activities of people - the phenomenon of global change… The evidence that these changes are affecting the basic functioning of the Earth System, particularly the climate, grows stronger every year. The magnitude and rates of human-driven changes to the global environment are in many cases unprecedented for at least the last half-million years." - Planet Under Pressure (Steffen *et al*, 2004, pg. 2)[1]

Since the onset of industrialization, human civilization has achieved a level of influence over the natural world that is unparalleled in both space and time, creating an era some have termed the Anthropocene (Steffen *et al*, 2007). Though pre-industrial societies had some influence on their local/immediate environment, what sets the current phase of human-environment interaction apart from pre-industrial times is its reach on spatial and temporal scales: the impacts have expanded from local to global, and their distribution in time has extended to an incredible degree. (ibid, pg 615, box 2). Numerous examples could be given for how this new human era has impacted the natural world; some of the most severe and pressing examples are biodiversity loss, biochemical cycle overload (i.e. nitrogen), and global climate change, all of which have already exceeded the proposed boundaries to maintain a "safe operating space for humanity" (Rockstrom *et al*, 2009).

The recognition of the wide spread and long-lasting effects of human activity on the natural world is not necessarily a contemporary phenomenon. Grove (2002) argues that environmental awareness and global reaction to environmental change is nearly three centuries old. In the United States, a relatively late comer to environmental conservation (ibid), influential figures such as Gifford Pinchot, John Muir and Theodore Roosevelt were arguing for ecological protection as early as the mid 19th century. In the early 1960s, the publication of Rachel Carson's (1962) influential book *Silent Spring* offered a charismatic, scientifically based account of the potentially disastrous and unforeseen consequences of pesticide use on the natural environment, sparking concern in the American public and leading to the

[1] The opening quotation is from the International Geosphere-Biosphere Program, "launched in 1987 to coordinate international research on global-scale and regional-scale interactions between Earth's biological, chemical and physical processes and their interactions with human systems" (IGBP, 2012).

banning of the insecticide DDT in 1972 (Oreskes, 2010b). More recent examples such as the recognition of industrially sourced acid rain in Europe and the United States and stratospheric ozone depletion and the resultant "ozone hole" have further established the reality and extent of modern societies' ability to impact the global environment (ibid).

Though environmental awareness has in many ways gained significant status over the last half-century, many contemporary socio-ecological problems such as global climate change have yet to gain sufficient recognition as urgent problems by civil society, particularly in the United States, and thus have yet to be satisfactorily addressed. What are the barriers to social support for change and what are the best strategies for surmounting such obstacles? If the mainstream approaches have yet to prove successful, why have they failed and how can they be improved? Who are the most suitable actors for engaging audiences in various contexts and what is the most appropriate moment for doing so? These are all important questions in dire need of answers if timely solutions are to be developed. An ambitious scientific agenda exists that seeks to answer such fundamental questions, epitomized by the emerging field of Sustainability Science.

1.2 The Anthropocene and Sustainability Science:

Sustainability science is "a field defined by the problem it addresses rather than the discipline it employs" (Clark, 2007, pg. 1737). The relatively new field is grounded in the need to conduct research and enhance understanding of problems that span temporal and spatial scales in order to better steer nature-society interactions along a sustainable trajectory (Kates *et al*, 2001). In seeking to fulfill this transformational agenda, there is a strong focus on the dynamic interactions between nature and society, with equal attention to how social change shapes the environment and how environmental change shapes society (Clark, 2003). This includes the development of strategies that can cope with highly uncertain dynamics, including feedback loops and imbedded structures and sub-systems, which cannot be achieved through silver bullet solutions or panacea style policy prescriptions (Anderies *et al*, 2007; Ostrom *et al*, 2007). Often, these solutions must be culturally and geographically specific, and the socio-cultural and environmental context must be taken into consideration along every step of the way (Ostrom, 2007).

Another significant aspect of this scientific quest for sustainability is the need for enhanced interaction between traditional academic disciplines, between science and policy, and between science and civil society and agents of social change (Jager, 2006; Lang *et al*, 2012; Max-Neef, 2005). To produce effective

solutions from these enhanced interactions, actors must also consider the quality of communication in their relations, recognize the need for a plurality of responses, and address the endemic conflict in any decision making process (Verwij *et al*, 2006). Addressing complex sustainability challenges requires the development and institutionalization of a variety of competencies which enhance actors' abilities to effectively bridge these various gaps (Yarime *et al*, 2012; Wiek *et al*, 2011b). Thus far, the sustainability science field has focused primarily on bridging the gap between traditional academic disciplines and enhancing the interaction between science and policy; however, addressing disconnects between scientific knowledge and civil society has been somewhat neglected in both sustainability science education and research (discussed further in chapter 8) (Wiek *et al*, 2012a; Wiek *et al*, 2012b). Few sustainability challenges exemplify this short coming better than the case of global climate change.

In the following sections, I will show that in many places a significant divide between the mainstream perspective of the international scientific community and that of civil society exists regarding the facts of climate change, using the notoriously cynical United States of America as an example. By exploring and moving past the mainstream explanations for this divide, I will ultimately develop and present a more inclusive alternative explanation. Based on this novel explanation, I will eventually discuss a more effective strategy for addressing the problem all together, one which emphasizes opportunistic moments and context specific intervention.

1.3 Connecting Science and Civil Society: The Case of Climate Change

Climate change has gained significant attention over the last several decades and is the focal point of an extensive body of scientific research and the topic of fierce political debate. It is defined by the United Nations Framework Convention on Climate Change (UNFCCC) as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods" (United Nations, 1992)[2]. In the last decade or two, scientists around the globe have reached a "consensus" regarding the reality of climate change (Oreskes, 2004). The concept of consensus does not imply total agreement on all aspects of climate change, as variation is the norm within the scientific community, particularly for a complex issue like climate change (Swart *et al*, 2009). Though some have critiqued the term "consensus" itself (van der Sluijs *et al*, 2010; Bray, 2010), the concept for the sake of this thesis holds utility insofar as

[2] The UNFCCC definition will be employed throughout this thesis. It should be recognized that the UNFCCC definition is not identical to the definition adopted by the IPCC (2007).

it implies a mainstream perspective throughout the scientific community; a terminological debate is not of interest for the task at hand.

1.3.1 The Climate Change Consensus:

The consensus around climate change has been supported by various non-scientific actors; for example, economist Nicholas Stern, author of the celebrated "Stern Review", argues that climate change is "the greatest and widest-ranging market failure ever seen" (Stern, 2007, pg. 1) and the United States Department of Defense has recently marked climate change as a national security priority (United States Department of Defense, 2010). The concurrence of such individuals and institutions with the scientific consensus may come as a surprise since, as the UNU-IHDP (UNU-IHDP, 2012) has recognized, "climate change is not simply a technical problem that can be addressed by improving existing systems and technologies… it is also a challenge that is intricately related to other ecological, social and economic issues" (UNU-IHDP, 2010, pg. 32). In other words, dealing with climate change implies recognizing and addressing serious economic, social, and political shortcomings.

Support from such unusual actors is grounded in substantial scientific evidence which informs the scientific climate change consensus. The Intergovernmental Panel on Climate Change (IPCC, 2012) is widely regarded as the world authority on the state of climate science, receiving the 2007 Nobel Prize "for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change" (The Nobel Foundation, 2012). In their fourth and most recent assessment report (AR4), the IPCC panel stated that "warming of the climate system is unequivocal" and "most of the global average warming over the past 50 years is *very likely* due to anthropogenic [Greenhouse Gas] increases" (IPCC, 2007, pg. 50; emphasis in original). Even as early as 1979 the consensus around climate change was beginning to solidify as the United States National Academy of Sciences had issued a report entitled *Carbon Dioxide and Climate: A Scientific Assessment* which concluded: "If [anthropogenic] carbon dioxide continues to increase, the study group finds no reason to doubt that climate change will result and no reason to believe that these changes will be negligible… a wait-and-see policy may mean waiting until it is too late" (United States National Academy of Sciences, 1979, pg. iv).

Respected science historian Naomi Oreskes has argued that "the scientific consensus [on climate change] is clearly expressed in the reports of the [IPCC]" and the "IPCC is not alone in its conclusions" (Oreskes, 2004, pg. 1686). Her position is echoed by the "statement on the global response to climate

change", signed by the national science academies of the G8 nations and Brazil, China and India (The Royal Society, 2005). The statement provided clear, strong, and definitive support for climate change action by some of the most authoritative scientific organizations on the planet. Furthermore, in a study that analyzed 928 articles with the key words "global climate change" catalogued in the Institute for Scientific Information's Web of Science, a data base that indexes peer-reviewed articles from over 8,500 scientific journals, not a single article was found that provided evidence to *refute* the scientific consensus around climate change (Oreskes, 2007, pg. 71).

It is clear that ample scientific information is available and that the reality of anthropogenic climate change is not seriously contested in the scientific realm. Also, a variety of credible and authoritative academic and governmental organizations have emphasized the urgent need to address the climate change issue. However, little comprehensive or effective action has been taken on the national or international level to address the problem. Few examples demonstrate this fact better than the case of the United States of America, one of the world's largest Greenhouse Gas emitters (Parker, 2008). In chapter 2, I will expand this issue and discuss it in more detail.

2. Climate Change, Politics, and Civil Society in the United States:

2.1 The United States' "Political Climate":

In the United States, the climate change issue has largely been connected to and divided between the two major political parties and their associated value systems: i.e. between democrats and republicans (McCright, 2011a; McCright, 2011b) and liberals and conservatives (Hoffman, 2011; The Pew Research Center, 2010). This divide has led many Americans to consider climate change solely as a political issue (Hoffman, 2011). Individual Americans often accept or deny climate change based on their socio-political orientation, regardless of the information available to them or their perceived level of understanding (McCright, 2011c). The politicization of climate change has largely been accompanied by "doubt mongering" where interest groups are "intentionally waging campaigns of doubt against climate science" with the understanding that "if people think the science is contentious, they are unlikely to support public policies that rely on that science" (Oreskes, 2010a, pg. 686)[3]. This can be exacerbated by the prestige press, which tends to portray the climate change issue as a point of serious debate within science, though this is false (Oreskes, 2010b).

Boykoff (2004, 2007a, 2007b, 2007c, 2008) has argued that the misrepresentation of the scientific consensus by the media stems from the journalistic norm of "balanced" coverage (i.e. giving equal weight to opposing sides of an issue) which may lead to a massive distortion of reality. Furthermore, Antilla (2005) has argued that a journalistic preference for controversy has strengthened the false belief that climate change is contested among scientists and has reinforced the socio-political divide. This politicized divide leads many to believe that the degree of action taken to address climate change relies heavily on the political party in power; however, in the United States this premise has not played out in practice.

2.2 Bi-partisan Inaction: Political Parties and Climate Change Policy

Between the time that climate change appeared on the international agenda (i.e. late-1980s), and the 2001 presidential inauguration of George W. Bush, the United States generally played a cautious, even blocking, role in the international climate change arena, which has hindered the development and

[3] For example, Republican Senator James Inhofe of Oklahoma has proclaimed that 'Global warming is the greatest hoax ever perpetrated on the American people' (quoted in Antilla, 2005, pg. 338) and has also likened climate alarmism to pornography addiction (see for example Inhofe, 2006).

adoption of "preferred policy responses" (Agrawala, 2001). During the GW Bush administration, the limited action taken within the United States was almost exclusively restricted to voluntary actions in place of regulation, which failed to curb the growth of Greenhouse Gas emissions in the country (Christiansen, 2003). Furthermore, during this time the United States signed but never ratified the Kyoto Protocol, by far the most well-known international climate agreement. Bang *et al* (2007, pg. 1282) argue that the United States was never likely to join any international climate regime that was based on the Kyoto Protocol, and suggested that international action by the United States would likely require "the emergence of a new climate regime that basically extends US regulation to other countries". The majority of policy approaches that were attempted during the GW Bush years were more "bottom up", from local and regional entities (Byrne *et al*, 2007; Lee *et al*, 2001); for example, the Regional Green House Gas Initiative (Regional Greenhouse Gas Initiative, 2012). Still, the point remains that the GW Bush administration, like administrations before him, never advanced or passed any comprehensive climate change legislation at the national or international level.

Harris (2009, pg. 970) argued that the post-Bush era would be one marked by improvements in climate change policy and international agreement, stating: "One thing seems clear: in the [post-Bush era], the United States is unlikely to continue actively opposing the rest of the world's…efforts to finally take climate change seriously", implying that a change in political administration would lead to better or more action. The administration under current president Barack Obama claims to be "moving ahead on climate change initiatives… through the *voluntary* goals agreed to at Copenhagen (COP15)" (Congressional Research Service, 2011; emphasis added), though it has yet to enact any national level legislation. Voluntary actions were also taken by the GW Bush administration, suggesting that little has changed with the new US President. In his 2012 State of the Union Address, Obama clarified the political reality of the climate change issue in Washington by stating: "The differences in this chamber may be too deep right now to pass a comprehensive plan to fight climate change" (Huang, 2012), effectively conceding defeat and hammering the final nail into the coffin for national climate change legislation in the near term.

The supposedly differing political positions on climate change in the United States are largely insufficient to explain the serious lack of action in the country, forcing the investigation elsewhere. Some have suggested that powerful ideologies and a cultural preference for the market over the state have largely shaped American engagement with climate change in the past (Agrawala, 2001), placing the issue in the

realm of civil society instead of politics and government. It is here that I will direct this investigation next.

2.3 Climate Change in the American Mind:

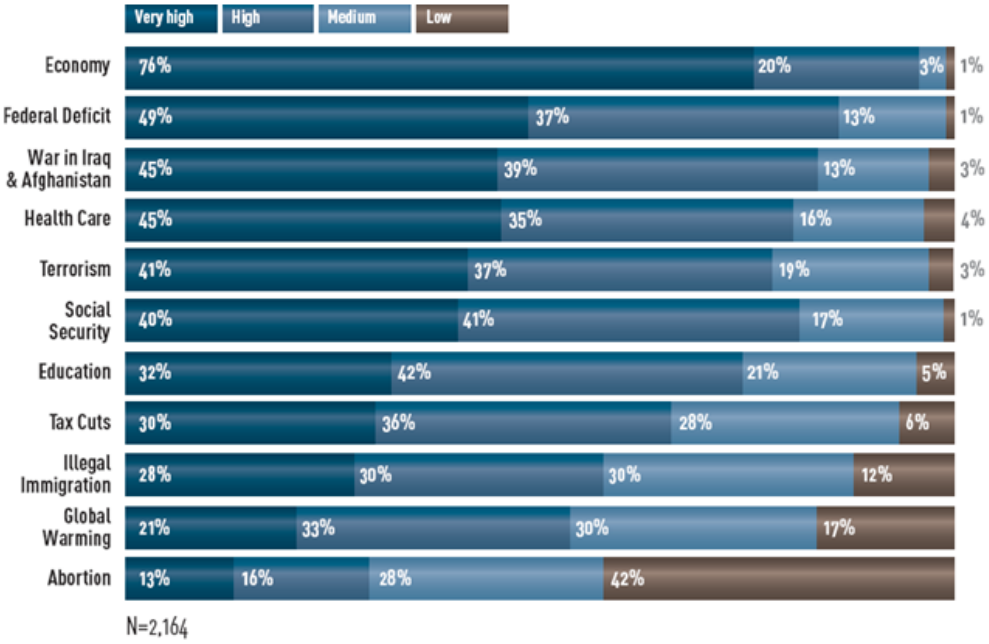
Public perception and interest can be a major driver of political agendas (Carter, 2007) so looking at the public's opinion of climate change may help explain why neither political party has taken climate change seriously. When it comes to the perception of climate change in the American mind, a 2011 survey by the Yale Project on Climate Change Communication and the George Mason University Center for Climate Change Communication[4] revealed that 64% of American adults believed that climate change was real, and of those respondents, 54% considered themselves "very" or "extremely sure" about their beliefs (Leiserowitz, 2011). These percentages had declined by 7% and 18%, respectively, since the same survey was conducted in 2008 (roughly the beginning of the most recent financial crisis) (ibid). However, believing in climate change does not necessarily translate to concern about it; when asked if they were worried about climate change, 72% of respondents were either "somewhat" or "not very" worried, while 19% were "not at all worried" (ibid).

Although the greater part of American's believe that climate change is real, it seems only around half are confident in their position and the vast majority are not particularly worried about it, with less than 1 in 3 people believing that climate change will ever harm them personally (Leiserowitz, 2005; Leiserowitz *et al*, 2010, 2011). Section 2.1 eluded to the legitimate concerns regarding the influence of political polarization and media "balance" on climate change outreach campaigns; still, the fact remains that, even though a majority of Americans think climate change is real and there is ample information available, they have pushed it to the bottom of the national priorities list (Figure 2.3)[5] (see section 3.1 for a discussion of the limits of educational outreach campaigns in general).

[4] This survey utilized the term "Global Warming" instead of "climate change" in all their questions. Some have suggested that word choice (i.e. climate change vs. global warming) matters for various audiences, in particular American democrats and republicans (Villar *et al*, 2011). This should be taken into consideration, though the significance of wording in climate change perception and prioritization is beyond the scope of this study.

[5] It should be noted that the design of these surveys required respondents to individually decide on the priority level of each of the 11 listed national priority options rather than rank them against one another. This raises the question of whether this particular survey's representation is bias *in favor* of climate change. Perhaps respondents felt compelled to assign a priority level to climate change even if it would not have normally made their personal priority list. It seems that if climate change is a national priority in the minds of Americans they would also be proportionally worried about it, as they are about other issues; for example the economy, of which 71% of respondents claim they worry "a great deal" (Gallup, 2012).

Figure 2.3: How the American public rank climate change (i.e. global warming) among the top U.S. national priorities.



Source: Adapted from Leiserowitz, n.d., pg. 11, Figure 1.

This lack of concern among the American public might help explain why the United States' major political parties have not prioritized the climate change issue (i.e. if voters don't care, why should politicians?); however, there is still no sufficient explanation for the lack of concern and engagement among American civil society itself, as several other heavily politicized and contested topics *are* of great concern to the public (e.g. economic policy). This conundrum leads me to the first research question of this thesis.

2.3.1 Research Question 1:

- Why, despite the overwhelming evidence and scientific consensus, has the majority of the American public failed to prioritize and address climate change?

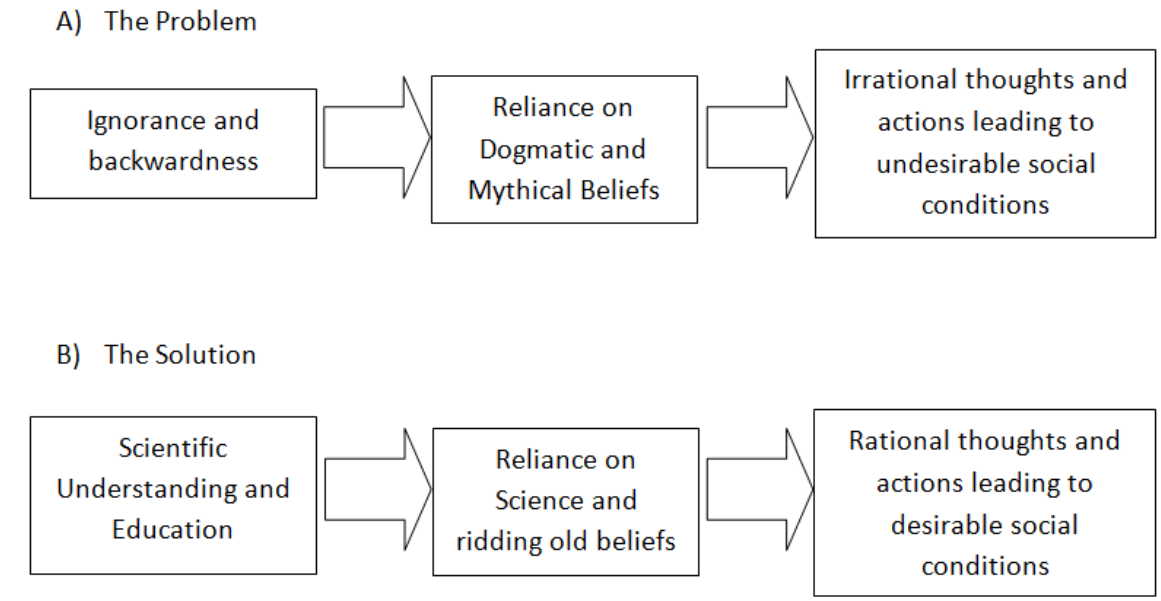
This question will serve as the basis for the discussion in chapters 3 and 4, and is underlain by an assumption as old as the Enlightenment. In my own experience, this assumption is one sometimes touted by European's; namely, that American civil society is essentially dim-witted, and not sufficiently informed about climate change. If politics don't offer a sufficient explanation, and ample information is available, maybe American's just aren't educated enough to properly understand the severity of the situation.

3. The Divide between Science and Society: The Information Deficit Model, Ideology, Discourse, and Hegemony

3.1 Does Education Lead to Rationality? The Enlightenment and the Information Deficit Model:

It is nearly impossible to separate the Enlightenment movement from the belief that historic, dogmatic traditions (i.e. myths) could be overcome through rational insights and analysis (Honneth, 1987) and for many Enlightenment thinkers this process was synonymous with education (Clifford-Vaughan, 1963). Today, this idea is commonly referred to as the "*information deficit model*" (Dickson, 2005). Enlightenment and the instillation of rational thought was optimistically treated by some as the panacea for what Condorcet called "error and ignorance, the true cause of [mankind's] misfortune" (quoted in Clifford-Vaughan, 1963, pg. 135). Based on this belief, John Stuart Mill even went as far as to suggest that only educated people be allowed to vote, or at least get a higher proportion of voting power compared to un-educated individuals (Library of Economics and Liberty, 2012). This information deficit model promotes science as the supreme form of knowledge and effectively holds a one-to-one correspondence between education and rationality. Figure 3.1 demonstrates the problem as understood by Enlightenment thinkers and the solution offered by the information deficit model.

Figure 3.1: The Information Deficit Model



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Today, this information deficit model continues to be strongly promoted (Sturgis, 2004); however, the connection between science and civil society seems to be much more complicated and fragile than conventionally believed. As a substantial body of empirical research suggests, the spread of scientific information, though important, does not necessarily lead to the adoption of what educators or communicators might consider "appropriate actions" (Chess, 2007). In other words, the deficit model has not proven universally effective, particularly in the case of climate change (Kellstedt *et al*, 2008). But why isn't the deficit model universally effective? First, the connection between science and civil society is not unambiguous. Thinkers such as Adam Smith, Max Weber and Sigmund Freud have all emphasized the role of various factors in influencing rationality and decision making, such as interest, culture/beliefs, and the subconscious. All of these aspects can distort the decision making process and create ambiguities in the dissemination of scientific information. In the next section, I will further develop this shortcoming in pursuit of a better explanation for the divide between the scientific and social climate change discourses.

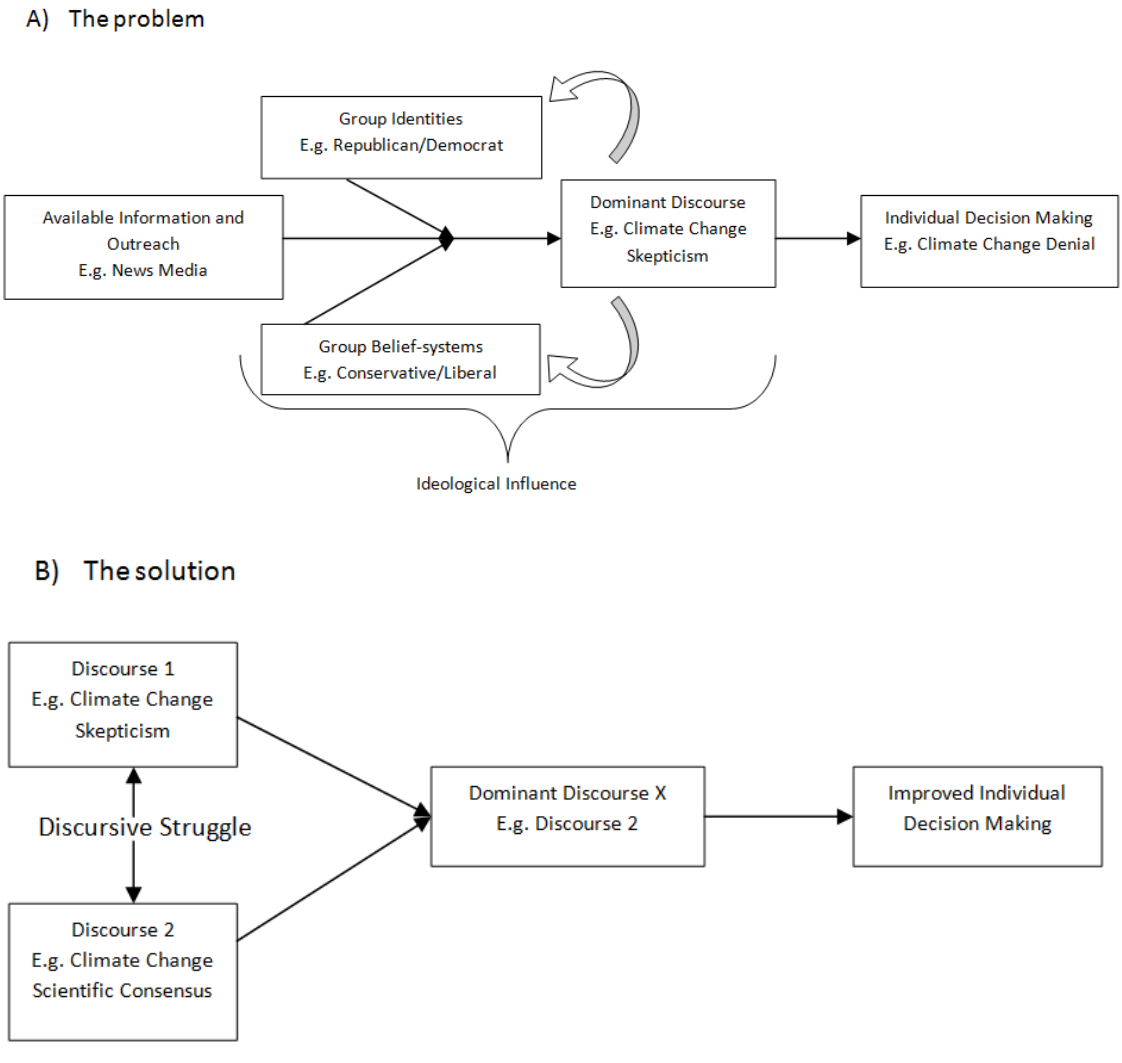
3.2 From the Information Deficit Model to Ideology and the Discourse Model

The information deficit model holds the assumption that scientific understanding could bring about the full consciousness of actors and therefore better inform decision making. But Freud's well known theory of the subconscious offered a major critique of the view that individual decision making is a solely consciousness affair. Social and cultural influences, as well as misrepresented social relationships, can lead to false consciousness and thus irrational behavior. This false consciousness is largely captured by the notion of *ideology*, a concept commonly utilized in the study of sociology and political science (Huaco, 1971; Mullins, 1972). Some suggest that ideology (as well as values and attitudes) may account for the behavior of most people, as it encompasses the cognitive, normative, and simultaneously conscious and unconscious influences on decision making (Maio *et al*, 2003; Duncan, 1987). Ideologies are not solely individual beliefs, but belief-systems of groups and "thus form the basis of the social representations and practices of group members, including their discourse(s)" which ideologies directly and/or indirectly affect (van Dijk, 2001, pg. 11-12).

Based on this ideology-discourse relationship, one could say that the scientific and non-scientific climate change discourses in the United States have their foundation in group identities and belief-systems (i.e. ideologies). Social discourses that are based on false consciousness are problematic, as they compete against other discourses for the claim to truth and legitimacy, though they are not necessarily based in

objective truth themselves (discussed further in section 4.1). Figure 3.2 demonstrates the problem as seen by proponents of ideology and discourse as well as the solution proposed by the "discourse model", namely the resorting to a "discursive struggle". Emphasizing the role of ideology and discourse helps explain the deficiencies of the information deficit model by rejecting the one-to-one correspondence between education and rationality and recognizing the affect of socio-cultural influences on decision making; however, this discourse model does not sufficiently explain where these ideologies come from to begin with or what can be done about them.

Figure 3.2: The Discourse Model



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Use of the term ideology has undergone a substantial transformation from its origin as the study of ideas (hence the suffix –ology), particularly under the scrutiny of thinkers such as Marx, Lukacs, and

Gramsci (Eagleton, 2007). The details of this transformation are a subject of intense scholarly debate, far beyond the scope of this thesis[6]. Still, from this sequence of transformations I can arrive at Antonio Gramsci's theory of *cultural-hegemony*, which captures and incorporates the notion of ideology, though its implications go beyond the reach of ideology itself (ibid). By utilizing the concept of cultural-hegemony dislodged from its original context, I am in effect taking a n*eo-Gramscian* approach to my analysis. This neo-Gramscian perspective will prove more useful in explaining the problematic social attitude toward climate change in the United States as it, unlike ideology, is inclusive of both discursive and non-discursive influences on decision making, as I explain in section 3.3.

3.3 Moving Beyond the Discourse Model: Neo-Gramscianism and the Power of Hegemony

Antonio Gramsci's original conception of (cultural) hegemony involves the various ideological, cultural, political, and economic aspects from which a dominant class can acquire approval (consent) from civil society in order to maintain social conditions that are favorable to that ruling class (Eagleton, 2007). The power of cultural-hegemony, as opposed to mere ideology, is that it is re-enforced and sustained through various routes, discursive and non-discursive, cultural and political, etc, while ideology "refers specifically to the way power-struggles are fought out at the level of signification" (ibid, pg. 113). Cultural-hegemony is, notably, located and recreated within both civil society and the state, as a combination of consent and coercion (Anderson, 1976-77).

Hegemony is fashioned through the manipulation of societal belief-systems in a way that establishes a "common-sense" world-view, imposed as the societal "norm", which becomes the *status quo* and maintains social conditions that are widely considered favorable to all society while actually only benefiting the ruling class. The manipulation of societal belief-systems and the establishment of a status quo create a situation where actors in civil society can both adopt ideologies and make decisions perceived to be rational and beneficial to their interests, when they are actually counter to their interest and thus irrational. This manufactured hegemonic world-view is not concrete and cannot exist on its own; rather, it must be recreated and reinforced on a regular basis by the various institutions within civil society and the state (Eagleton, 2007; Anderson, 1976-77).

[6] For a detailed account of the transformation of the concept of Ideology, see Terry Eagleton's (2007) Ideology: An Introduction.

The diverse implications of the power relations inherent to cultural-hegemony and the process of their establishment will not be pursued in this thesis (see further research, section 8.3); rather, the *concept* of cultural-hegemony specifically holds value for my analysis. I am not seeking to uncover how the current climate change hegemony was established; I am solely interested in how this hegemony can be overcome and what that implies for various strategies that seek to bring the social consensus closer to the scientific consensus in respect to climate change in the United States. The concept of hegemony places the mechanisms of influence at the cultural level, hidden from the sight of civil society and maintained through both discursive and non-discursive civil society and state institutions and practices; as a result, traditional approaches alone (e.g. discursive struggles or education) may be insufficient to overcome it. Rather, solutions (i.e. counter-hegemony) must also be sought at this cultural level. In Terry Eagleton's (2007, pg. 114) words, "any 'counter hegemony' must carry its campaign into the hitherto neglected realm of values and customs, speech habits and ritual practices". This point has major implications for both explaining why the social and scientific discourses have diverged and how agents of change can go about re-converging these different positions.

3.4 Neo-Gramscianism and Climate Change:

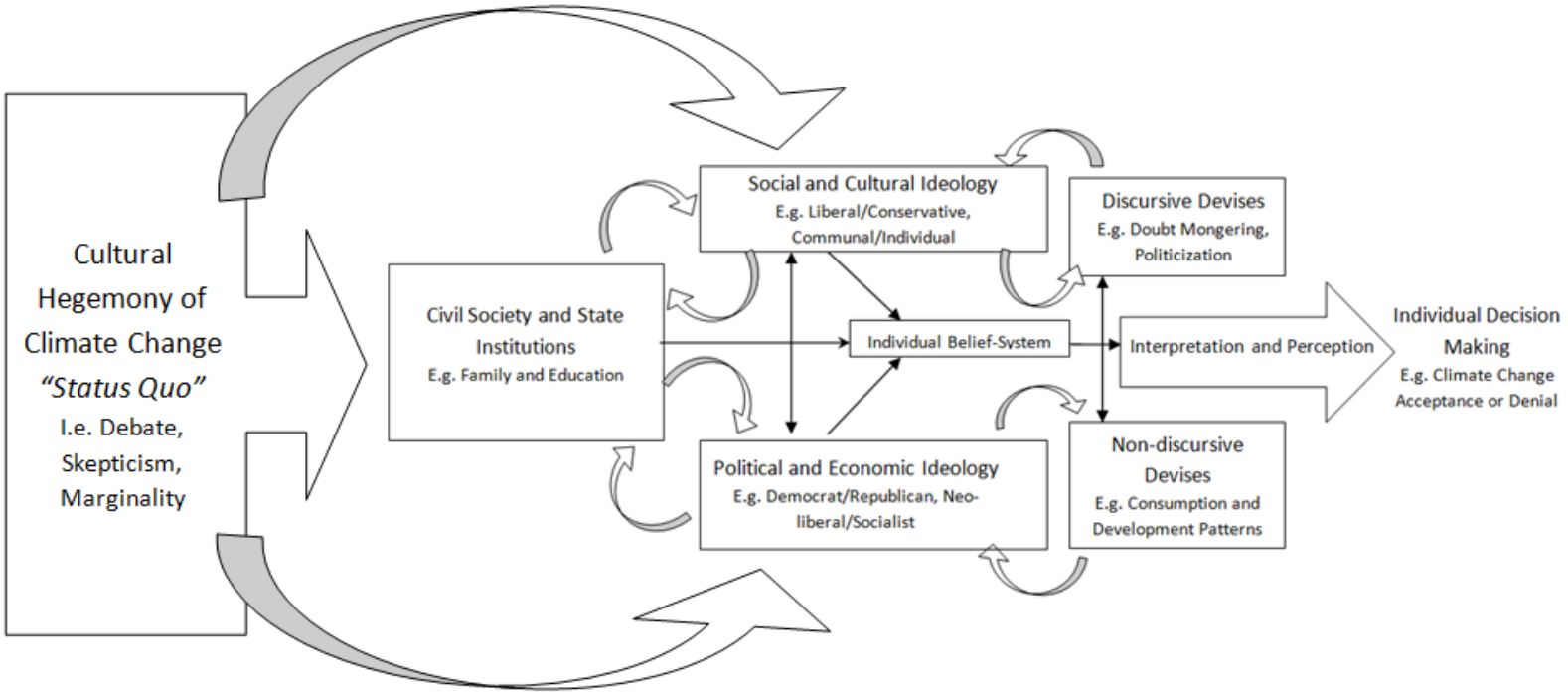
In this thesis, I do not utilize the original Gramscian theory of cultural-hegemony, which was primarily interested in the *establishment* and *maintenance* of class dominance in capitalist societies and the struggle for political and economic power (Anderson, 1976-77). I instead pursue Gramsci's idea of cultural-hegemony in a different context, namely the American inaction on climate change. Thus I have lifted the *neo-Gramscian* approach from the field of International Relations (IR), as it has proven useful for investigating my problem (see section 3.3). In the early 1980s, a flood of new and revived theories found their way into the study of IR: these included feminism, post-structuralism, Frankfurt School critical theory, and neo-Gramscianism (Rengger, 2007). Neo-Gramscianism itself emphasizes "the concrete empirical analysis of 'real world' processes and the linking of that to theoretical and emancipatory reflection and concrete political struggle" (ibid, pg. 8). The contributions from neo-Gramscian thought have already reached beyond traditional study subjects to topics including Genetically Modified Organisms (Andree, 2011), Globalization (Ramos, 2006), and Climate Change (Levy, 2003; Paterson, 2009).

In the context of climate change, the neo-Gramscian focus has often been on the struggle to counter or maintain hegemony in international climate change negotiations (Levy, 2003; Paterson, 2009). In this thesis, however, I am utilizing the concept of cultural-hegemony in a novel way by employing it as a

means to explain the divide between the social and scientific discourses in the United States. In other words, by capturing and incorporating the notion of ideology, the concept of cultural-hegemony allows me to place the driver of this divergence at the socio-cultural level, including both the discursive and non-discursive features, and helps clarify why neither the "best" political party nor the information deficit model have been sufficient to fully explain or address the divide. Figure 3.3 demonstrates the causal links between the undesirable cultural-hegemony in the United States and the resultant perceptions and decisions made by individual Americans.

At this point, I assert that in the United States the climate change issue is dominated by a cultural-hegemony that encourages uncertainty, polarization, and triviality (i.e. the social consensus) instead of conviction, convergence, and criticality (i.e. the scientific consensus). Having identified cultural-hegemony as the primary driver for this divide, chapters 4 and 5 are dedicated to developing a superior, cultural-hegemony based model (i.e. the "neo-Gramscian model") for overcoming this problematic divide by highlighting the neo-Gramscian approach's advantages over the discourse model previously discussed (section 3.2), as well as incorporating the most opportunistic moments and promising strategies for achieving this end.

Figure 3.3: How cultural hegemony affects people's attitudes and decisions



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4. Real or Relative? The Advantages of the neo-Gramscian Model over the Discourse Model:

The phenomenon I have termed cultural-hegemony has been well recognized, but the rubric of "dominant discourse" is more often employed to define and engage the problem. However, as I will explain shortly, the "dominant discourse" rubric will not suffice for my purposes as I am interested in strategies for overcoming the obstructive climate change cultural-hegemony. Resorting to a "discursive struggle" implies relying on discursive devises as the primary means to bridge the divided social and scientific perspectives. This approach is problematic as it neither fully addresses the drivers nor provides a foundation for effective solutions based on a distinction between the truth and falsity of differing discourses. As a plethora of scholars have promoted the communication of climate change science and the changing of social practices based on such scientific understanding (Moser, 2007), on what grounds can one assert the primacy of the scientific discourse over the social discourse in the first place? Is one groups discourse just as legitimate as the next? It is to this issue I will turn next.

4.1 The Limits of Discourse and the Importance of Naturalism:

From a relativist's perspective such as that of Richard Rorty (1991), one might argue that any variety of discourses (i.e. social or scientific) could claim truth in respect to one another, as relativists generally argue that truth is "made" through the agreements of people, not discovered objectively. From this, one may conclude that pretty much anything can be called "truth", as long as a group within civil society agrees to call it true (Searle, 1993)[7]. This relativist mentality largely relies on discursive devices (i.e. rhetoric, communication techniques, etc) as a means for developing and establishing "truth". This approach may not suffice for pressing sustainability issues like climate change because often only one discourse is objectively true, i.e. climate change is *actually* happening, independent of what people say about it, and ignoring it will simply exacerbate material problems for current and future generations (Calder, 2011). Furthermore, resorting to a discursive struggle only addresses a particular *device* and effectively ignores the *structure* of hegemony itself (see section 5.1 below).

The assertion that climate change exists independent of our knowledge of it brings me away from relativism and closer to a realist account of the nature of reality, with an emphasis on the naturalistic

[7] Searle (1993, pg. 79) critiques Rorty's (1991) position that truth is made and not discovered, insisting that "true *statements* are made, but the truth of statements is not, it is *discovered*".

foundations of phenomena like climate change (Searle, 1997)[8]. This basic realist principle is indispensible for this analysis as it provides a foundation for choosing the better of two discourses (i.e. true or false) based on their adherence to an independent, objective reality. There are, however, important socially constructed "realities" that must be considered (Donner, 2011). *Critical realism* offers an ontology and epistemology that can help reconcile these seemingly incompatible perspectives.

4.2 Critical Realism: Reconciling the Natural and Social Sciences

Critical realism[9] is considered by its proponents to offer an important mediation between the often conflicting philosophical and methodological positions traditionally held by natural and social sciences (Sayer, 2000; Carolan, 2005). The basic argument of critical realism is that there exists a world "out there", independent of our knowledge of it, but we can learn about that world through various practices. The knowledge we gain of the world is nearly always imperfect, as we rely on incomplete models and theories to inform our analysis and understanding of it (Bryman, 2004, pg. 12). As Sayer (2000, pg. 2) points out, "it is the evident *fallibility* of our knowledge-the experience of getting things wrong, of having expectations confounded, and of crashing into things- that justifies us in believing that the world exists regardless of what we happen to think about it" (emphasis in original).

An absolute, objective truth about this independent world cannot be guaranteed (or reached for that matter), but we *can* and *should* judge whether one understanding or explanation is better than the other. It is this fact that has led many proponents of critical realism to claim an emancipatory potential of social science research, as social practices are informed by ideas which may or may not be true, and the truth of these ideas has important implications for the conduct of society (Sayer, 2000). In other words, making decisions based on true ideas, rather than false ones, can lead to better social practices. This is ultimately the problem with the misguided social consensus around climate change in the United States; that is, by making decisions based on a hegemonic, erroneous world-view, actors are ultimately undermining their own (perhaps unknown) interests in avoiding a climate catastrophe.

[8] For a critique of Searle's book "The Construction of Social Reality" see Page (2004) and for a reply to this critique, see Searle (2004).

[9] Critical Realism remains controversial in the philosophy of science, however, it has "proven fruitful in stimulating new research agenda in a number of human sciences and interdisciplinary fields" (Benton, 2010, pg. 120). A detailed discussion of its history, transformation, and diversity of applications is far beyond the scope of this thesis. For ample introduction, see Sayer (2000) and Benton (2010).

4.3 A Critical Realist Ontology and Epistemology:

There are several concepts within critical realism that will prove useful for this analysis, of which, due to want of space, I can only briefly describe here, though their particular utility will be elaborated in section 5.1. The first is the differentiation between *intransitive* and *transitive* dimensions of knowledge. This ontology distinguishes between the unchanging objects of our knowledge (i.e. the intransitive dimension) and the dynamic theories and discourses we use to understand those objects (i.e. the transitive dimension) (Sayer, 2000; Benton, 2010). Our transitive models have no bearing on the intransitive objects they purport to explain; in Sayer's (2000, pg. 11) words, "there is no reason to believe that the shift from a flat earth theory to a round earth theory was accompanied by a change in the shape of the earth itself", but as I have alleged in section 4.2 (and discuss further in section 5.1), having a better understanding of the truth can lead to superior social practices.

The second useful concept within critical realism is the transcendental realist notion of *stratified reality*. As Benton (2010, pg. 126) explains, critical realism is a sort of "depth realism" which "attempts to penetrate behind or below the surface appearances of things to uncover the generative causes". This depth is captured in the 3 levels of reality:

- The Real: the mechanisms, powers, tendencies, etc which scientists seek to discover
- The Actual: the sequences of events that occur from the activation of the powers of the real
- The Empirical: the level of observed events

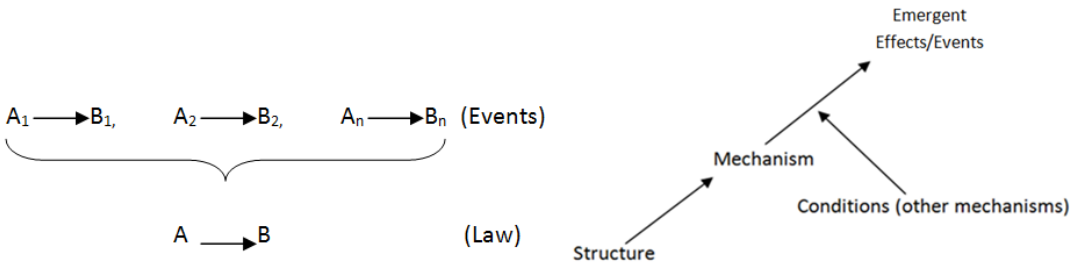
Stratified reality has important epistemological implications, as it implies things are not always what they seem, and serious work (scientific or otherwise) must be undertaken to uncover the true causes of various empirical phenomena, and thus to affect them.

The final concept useful to this thesis is the understanding of the process of *causation* in critical realist thought. Figure 4.3 demonstrates that, unlike the positivist view, a critical realist account of causation implies that "the future is open- things could go in many different ways" (Sayer, 2000, pg. 15). This is because causation is a much more complicated matter than positivists suggest and effects are often "emergent[10]" from their constituent mechanisms due to their foundation in a stratified reality (Sayer, 2000, pg. 12-13). These various aspects of critical realism offer important insights into the possibility for

[10] The concept of emergence describes "situations in which the conjunction of two or more features or aspects gives rise to phenomena, which have properties which are irreducible to those of their constituents, even though the latter are necessary for their existence" (Sayer, 2000, pg. 12).

social change, including what moments and strategies are likely to be most effective (discussed further in chapter 5).

Figure 4.3: A comparison between the Positivist and Critical Realist views of Causation



1) Positivist or 'successionist' view of causation

2) Critical Realist view of causation

Source: Modified from Sayer (2000, pg. 14-15, Figures 1.1 and 1.2)

It is also very important to acknowledge that individuals have a subjective understanding of "reality" which is not always in-line with the independent reality of various phenomena. This socially constructed reality can seem very "real" to the person who holds it and must be sincerely considered when developing intervention strategies (Donner, 2011) (discussed further in section 7.1). A critical realist perspective implies that, if science supplies the most reliable knowledge of climate change, the misguided American social consensus around the issue should be better aligned with the scientific consensus in order to cultivate better social practices (e.g. action for mitigation and adaptation). Still, we are left with a pressing question: How? This brings me to the second research question of this thesis:

4.3.1 Research Question 2:

- If the public attitude towards climate change in the United States is dominated by an obstructive cultural-hegemony, is it possible to foster a counter-hegemonic social attitude, and if so, how?

As I have shown in the previous sections, understanding the divide in the social and scientific climate change perspectives is a complex issue that involves reconciling the naturalistic aspects of climate change with various (often mistaken) social constructions of reality. The coupling of concepts from critical realism and a neo-Gramscian perspective provide the foundation for opportunities to over-come the obstructive public attitude towards climate change in the United States. Relying on the most opportune times and effective strategies for intervening in people's subjective understandings may increase the chances of successfully facilitating social change. Chapter 5 elaborates this point.

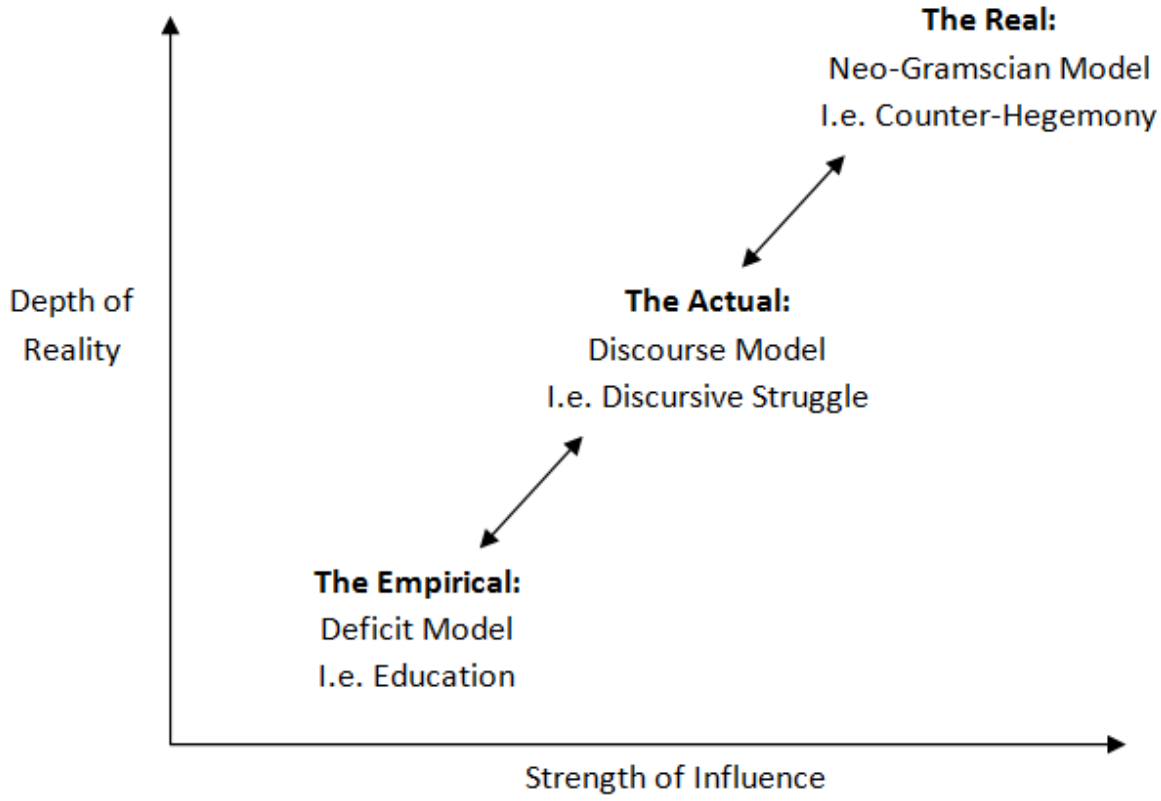
5. Facilitating Counter-Hegemony: Critical Realism, Crisis, and Opportunity

5.1 Possibilities for Change: A Critical Realist Perspective

As I have suggested in section 4.3, critical realism as an ontology and epistemology offers several concepts that are useful for this analysis. First, the differentiation between transitive and intransitive dimensions of knowledge provides a firm foundation for the possibility and necessity of change. The concept of transitive knowledge itself suggests that models of understanding not only can, but *should* change according to an improved understanding of the intransitive objects of study. To refer back to Sayer's (2000) (section 4.3) flat-earth analogy, the revelation that the Earth was round rather than flat necessitated a transformation of the model used to understand the world. If scientists did not adjust their model of understanding to account for this improved knowledge of the earth, then scientific advances like navigation, satellite communication systems, and space exploration would not have been possible; after all, you can't even *imagine* putting a satellite into orbit around a flat earth. This idea also applies to climate change. Civil society can and must adjust their models of understanding climate change to account for the dramatic improvements in scientific knowledge around the topic; otherwise, innovations become extremely difficult if not impossible to conceptualize or implement.

Next, the concept of a stratified reality suggests that what we experience at face value is necessarily only a small part of the true reality. This allows scientists to understand that a social phenomenon (in this case climate change skepticism) is not itself exhaustive of reality, but that there must be underlying structures and mechanisms which make that empirical reality come to be. As I have shown, this investigation has led me to mark a cultural-hegemony as the ultimate driver of the obstructive social attitude towards climate change in the United States, which I hold to exist at the level of the real. By understanding that the mechanism for the social consensus exists at this depth of reality, it becomes easier to understand why people cannot easily recognize it as such; furthermore, one could rightly assume that a change at the level of the real (i.e. counter-hegemony) could ultimately lead to a change in the empirical social phenomenon, via the significant influence of the actualization and realization of counter-hegemonic tendencies (figure 5.1).

Figure 5.1: A comparison of three models



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Finally, the critical realist account of causation provides insight into the most effective strategies for countering cultural-hegemony, including how and when to engage people about the subject of climate change. The result of a sequence of events is not pre-determined, rather, it can go a variety of ways depending on the external conditions that influence the chain of events (see figure 4.3). If one takes, for example, the climate change cultural-hegemony as the structure and doubt-mongering as the mechanism, then one can understand how a misguided social consensus can be the effect of such a chain of causation. However, as I will show below, external conditions such as a climate-related disaster can intervene in the chain of causation, breaching expectations and calling the *status quo* into question, leaving the effect open for change. I return to this idea in section 5.2.

The distinction between transitive and intransitive dimensions of knowledge, the concept of stratified reality, and the nature of causation as viewed from a critical realist perspective makes intervention

based social change plausible and desirable. If such intervention combines experience that breaches expectations and challenges the legitimacy of the cultural-hegemony with relevant information that is credible in the eyes of various actors, the outcome may be significant.

5.2 Opportune Moments: Crisis and Confounded Expectations

We can't expect to have a revolution every other Tuesday. Climate activists that discursively compete with media moguls like FOX and CNN through the same routes employ at best an under-dog approach, considering the substantial resources available to the latter compared to the former. It seems that effective solutions may require stepping outside of the traditional paths of information dissemination (i.e. Media, Schools, etc) to look elsewhere for intervention opportunities; but where? In his writings, Karl Marx emphasized the necessity of economic crisis in rallying support for revolutionary action, and since this crisis was imbedded in the capitalist system itself, he saw revolution as inevitable (Callinicos, 2007). More contemporary philosophers such as Alain Badiou and Slavoj Zizek have emphasized the importance of singularities, or "events", in exposing "Truth" and facilitating social change (Callinicos, 2006, pgs. 83-119). Badiou, somewhat confusingly, describes the truth revealing "event" as "an element of the situation such that its membership of the situation is un-decidable from the perspective of the situation" (Callinicos, 2006, pg. 90). In other words, truth can be "materially produced in specific situations and each begins from an event or discovery that eludes the prevailing logic that structures and governs those situations" (Hallward, 2003, pg. xxv).

This reliance on the "event", or moments of crisis, is an important notion for overcoming cultural-hegemony. When things are going well, such as during a time of economic growth, few people question the logic of the social structures of which they are a part. After all, why question the system when it is supposedly providing for you, and nothing seems to be awry? This is just as true for the United States climate change cultural-hegemony; if there is no visible sign of a climate problem, why question the status quo? However, as Marx (and later Badiou and Zizek) knew well, crisis does occur, and those moments can provide exceptional opportunities for changing peoples' subjective understandings. Take, for example, the following cases:

- **The Dangers of Tobacco**: Before the mid-20th century, few people, if any, questioned the health risks of tobacco smoking; as a result, tobacco products were not regulated. However, as cases of cancer and other smoking related illnesses began to sharply rise, people became alarmed and began to question the mainstream view that tobacco was completely safe. After ample social

pressure and scientific inquiry, tobacco is now one of the most highly regulated products on the market (Oreskes, 2010b).

- **Aerosols and Ozone Depletion:** For many decades, chlorofluorocarbons (among other chemical compounds) were used in producing various household, commercial, and industrial products. Nobody questioned the potential dangers of these seemingly harmless chemicals, until it was discovered that the Earth's Ozone layer had been substantially depleted over various regions. This crisis prompted substantial scientific investigation, and led to the replacement of ozone depleting chemicals with far safer substitutes (McFarland, 1992).
- **Fukushima Disaster and Japanese Nuclear Policy:** For many decades, Japan had utilized nuclear power for nearly 30% of its electricity production, with little mainstream resistance to the operation of old and construction of new power stations. However, in March, 2011, the Fukushima Daiichi nuclear power station suffered a catastrophic failure and partial meltdown after a major earthquake and subsequent tsunami, clarifying the reality of the risk posed by nuclear power facilities. This has had a dramatic influence on nuclear policy in the country, with widespread anti-nuclear power movements forcing the government to halt construction of new plants and shut down and assess the safety of nuclear stations currently in operation. Japan shuttered its last active nuclear plant on May 5th, 2012, operating nuclear free for the first time since 1970 (Goodman, 2012).

As all of these examples show, the status quo of various issues can be confounded through a confrontation with reality. They also demonstrate that there can be a profound difference between decisions based on description and decisions based on experience (or a combination of the two) (Hertwig *et al*, 2004). What all of the above cases share, is the breach of expectations that occurred through the direct or indirect experience of a crisis. Past examples like these lead me to suggest that climate-related natural disasters can act as "breaks" in the climate change hegemony in the United States. E. Weber (2006, pg. 116) has suggested that "increasing personal evidence of [climate change] and its potentially devastating consequences can be counted on to be an extremely effective teacher and motivator", and this claim is supported by a substantial amount of empirical research (particularly sociological) regarding human system responses to disasters of various kinds (see Drabek, 1986)

It is important to know when the most appropriate moments to intervene and engage various audiences about a particular issue are to avoid wasting limited resources on non-effective campaigns. Such personal experience with climate change may become more prominent sooner than many realize, as the

latest IPCC special report emphasizes the need to improve strategies for adapting to climate-related extreme weather in a timelier fashion, offering evidence of an increasing trend of many environmental hazards (IPCC, 2011). Figure 5.2 (a) offers an outline and figure 5.2 (b) offers the full representation of the neo-Gramscian model I have developed thus far, combining the causal mechanism for the obstructive public attitude towards climate change with the promising moments (i.e. natural disasters) to intervene and potentially over-come it.

In early 2012, I conducted field interviews in the state of Texas in order to get a better understanding of how different climate change "audiences" made sense of their experience with climate-related disasters. The primary hypothesis for this field work was that climate-related disasters, through the confounding of expectations, would in effect confront the hegemonic world-view held by most individuals, making it more plausible those individuals would question the legitimacy of the climate change hegemony. This moment of confrontation could also prove to be an important entry point for effective intervention, which could direct peoples' subjective understandings more towards a counter-hegemonic world-view which concurs with the scientific climate change consensus (see figure 5.2 b). The interview findings are provided in a narrative format (based on Bryman, 2004, pg. 212-214) with ample quotation in order to highlight the differences and similarities in the various audience's perceptions of their experiences. This field work is not meant to provide definitive proof of any particular theoretical claim; rather, it is meant to *exemplify* how the assorted themes throughout this thesis may actually affect various actor personalities who all experienced similar climate-related disasters in 2011.

Figure 5.2 a: Outline of the neo-Gramscian Model

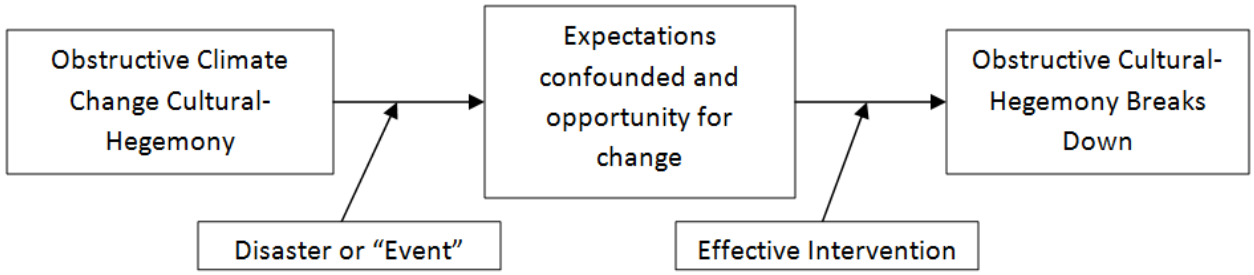

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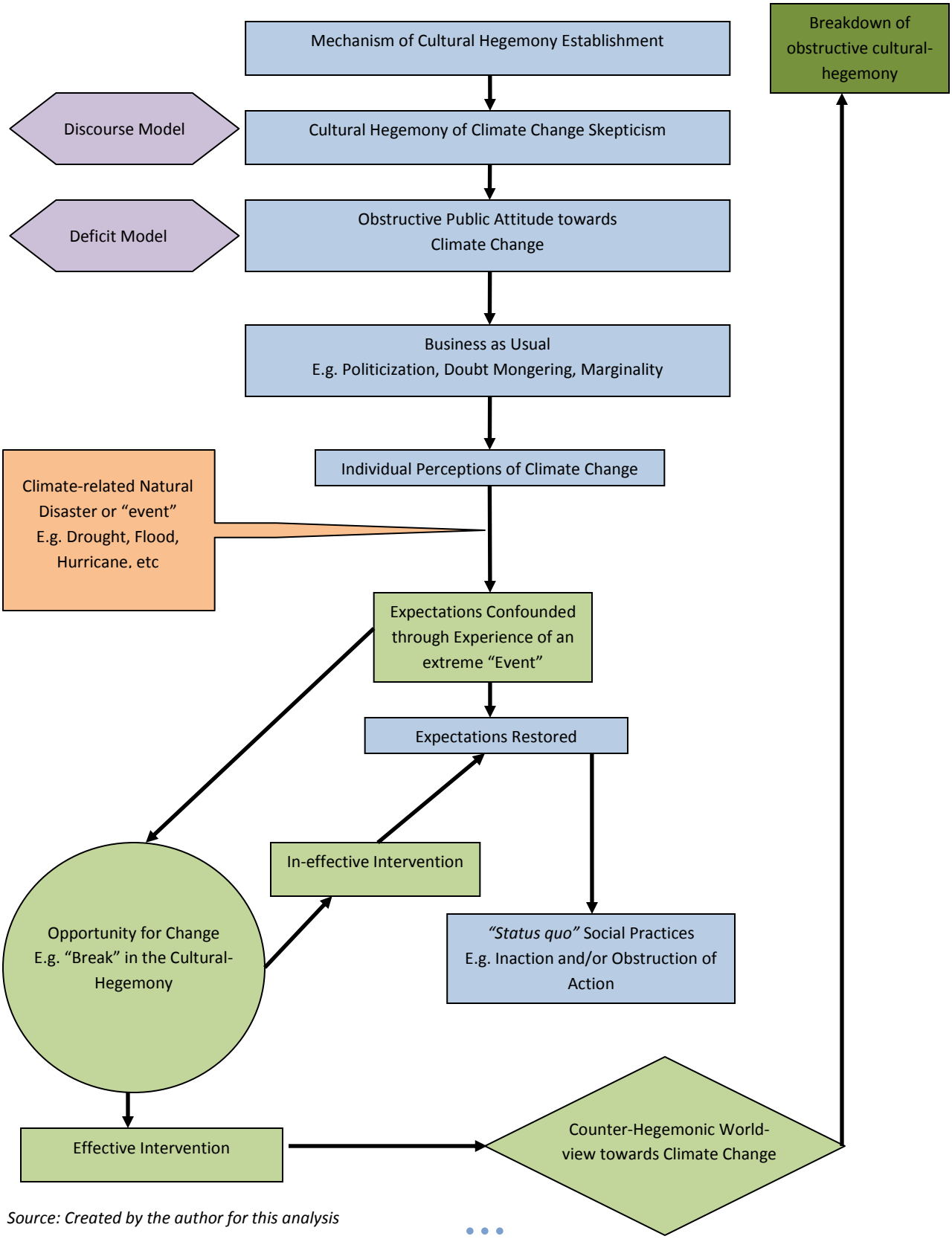
Figure 5.2 b: The Full Neo-Gramscian Model

This diagram combines the status quo sequence of affairs (blue), the occurrence and experience of an external "event" (red), and a strategically induced alternative sequence of affairs (green). Also shown are the intervention points of two other models (purple).



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6. Evidence from the Field: Climate Crisis in the Lone Star State

6.1 Theoretical Approach and Field-Research Design:

The field research for this thesis was grounded in a critical realist ontology and epistemology (see sections 4.2 and 4.3). Since I was examining the interaction between a natural and social phenomenon, and interested in the social experience, I employed an interpretivist research strategy (Bryman, 2004, pg. 13), a comparative research design (Bryman, 2004, pg. 56) and used the method of interviewing. I approached the interviewing process with the assumption that the various audiences would have interpreted their experiences with the 2011 extreme weather events in a variety of ways based on their social and cultural belief-systems and geographical context, and further imagined that their experience with extreme weather events may have affected their perspective on climate change or their willingness to engage in discussion about the topic. In order to minimize the influence of the climate change issue on respondents' experiential descriptions, I placed the climate change-related questions in the final part of the interview.

6.1.1 Study Site: Howdy from Texas

With a population of nearly 25 Million and a gross domestic product of over 1.2 Trillion USD counted at the last census, Texas is the second most populous state and the second largest economy in the United States (United States Census Bureau, 2009). Texans are well known throughout the country for having a uniquely confident viewpoint towards their state and themselves, with famous slogans like "Don't mess with Texas", "Everything's bigger in Texas", and "Texas born, Texas proud." This mentality is manifest in the abundance of excessively large pick-up trucks, engorged barbeque sandwiches, and week-long rodeos. Texas also has the highest level of GHG emissions of any state in the country in several categories (Ramseur, 2007). The state had a record breaking weather year in 2011, being ranked number one of the top ten "hardest hit states of 2011" regarding extreme weather, with a record heat wave, the driest 12 months on record, and the worst wild fires ever recorded in the state (Freedman *et al*, 2011). The combination of a large population and domestic product, unique culture, hefty GHG emissions, and a record setting climate-related disaster year made Texas an interesting and relevant location to conduct field interviews for this thesis.

6.1.2 Interviews:

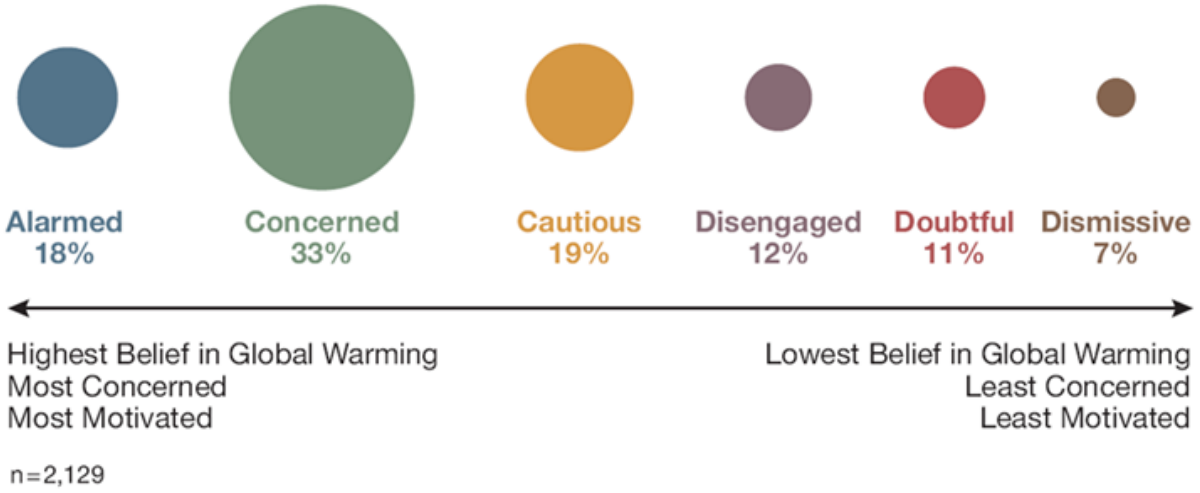
Interviews were conducted in a variety of locations throughout the city of College Station, Texas, as well as via telephone when in-person interviews were not possible. All interviews were done at locations and

times specified by the interviewees, lasted between 30 and 75 minutes, were semi-structured, and recorded. Each interview was conducted in 3 parts, beginning with a simple personal characteristic questionnaire (verbal) (Appendix A), proceeding to open-ended questions about individual experiences with extreme weather in 2011 (Appendix B), and concluding with open-ended questions about interviewees perspectives on various aspects of climate change (Appendix C). The interview design was evaluated and updated based on recommendations provided by Bryman (2004, pg. 342). In order to minimize any possible interview bias, anonymity was guaranteed, questions were kept as simple as possible and worded to minimize leading, follow up questions were asked to get respondents to clarify or elaborate on important topics, care was taken to not react to answers or reveal my personal perspective on the various issues discussed throughout the interview process, and questions were left open-ended, allowing respondents to elaborate as much as they felt comfortable, loosely following recommendations by Buckingham (2004, pg. 134). Also, my attire was casual and I believe my status as a Master's student helped keep interviewees from being intimidated, as several were PhD holders or PhD candidates, and some were "elites" (see Smith, 2006).

6.1.3 Interviewees:

Interview samples were chosen using the snow ball method, and theoretical saturation (based on Bryman's (2004, pg. 305) definition) was nearly achieved, though not completely. As I was interested in how different audiences interpreted their experiences with climate-related disaster, a climate change "audience" typology was used as a reference point for saturation. Figure 6.1.3 shows the *Global Warming's Six Americas* typology, created by the Yale Project on Climate Change and George Mason University Center for Climate Change Communication (Maibach *et al*, 2009), which is meant to provide an exhaustive spectrum of possible climate change positions in the United States.

Figure 6.1.3: The Six Americas Climate Change Typology Spectrum.
Circles are proportional to population percentages.



Source: Adapted from Maibach et al (2009) Figure 1, pg. 3

A total of 8 interviews were conducted, with 2 women and 6 men between the ages of 25 and 62. A substantial degree of theoretical saturation was accomplished, though not complete saturation, since I was able to interview individuals from the "Dismissive"[11] audience, which is the smallest percentage audience (see figure 6.1.3). Initial interview contacts were made through personal connections who were then asked if they knew of other people who might be willing to interview. Originally, I specifically sought individuals who most likely had a direct connection to the 2011 climate-related disasters (e.g. cattle ranching professionals, etc). Eventually, I sought interview subjects whom most likely *did not* have a direct connection to the climate-related disasters (e.g. city residents), in order to provide a wider range of experiential circumstances. Annual personal income of the respondents ranged from <$25,000 to >$100,000, social values ranged from extremely conservative to extremely liberal, and political orientation ranged from committed republican to committed democrat (including non-party affiliates).

6.1.4 Analysis:

The analysis was conducted using two different methods: content analysis and narrative analysis. All interviews were transcribed in detail and analyzed using basic content analysis (see Bryman, 2004, pg.

[11] The Dismissive audience, the smallest of the 6 audiences, strongly deny and actively oppose climate change and are by far the least likely to change their minds about it (Maibach *et al*, 2009).

183). The questions asked in the final portion of the interview (i.e. perspectives on climate change) were formulated based on the questions used in creating the Six Americas typology; thus, based on interviewee responses, I was able to decide which of the climate change audiences the respondents belonged to. This content analysis, and subsequent categorization of the respondents, informed my approach for reaching theoretical saturation. At the end of the analysis, I ended up with the following typological distribution: 0 Dismissive, 1 Doubtful, 1 Disengaged, 2 Cautious, 3 Concerned, and 1 Alarmist. After achieving the highest degree of saturation possible in the time given to field work, I chose not to pursue additional interviews in favor of studying the 8 obtained interview narratives in detail in order to highlight the individualism and uniqueness of each respondent (after Riessman, 2004a).

Since I was interested in how different people's interpretations of experiences with the 2011 climate related disasters varied, in the second part of my analysis I chose to utilize a simplistic form of narrative analysis which emphasizes the personal, situated, and locally produced accounts of experiences through the telling of stories which people construct to make sense of the world around them (Silverman, 2010, pg. 225; Bryman, 2004, pg. 412). There is no "best practice" for analyzing narratives, but such an approach has been utilized in the investigation of a wide variety of topics and by an array of academic disciplines (for example, sees Edvardsson *et al*, 2003). Riessman (2004a, pg. 708) explains that "narratives do not mirror the past, they refract it… they are useful in research precisely because storytellers interpret the past rather than reproduce it as it was." Though the questions were not initially designed using "narrative interviewing" techniques, narratives emerged unexpectedly and therefore narrative analysis lent itself as a more appropriate method for analyzing the data collected; it should be recognized, however, that questions specifically designed to produce narrative accounts could perhaps have produced more detailed narratives (see Riessman, 2004b), something to be considered in future studies.

6.1.5 Limitations of Field Research:

As mentioned above (section 5.2), this field work offers examples, not definitive proof, of various theoretical claims advanced in this thesis. Still, as with all research, there are several limitations that should be considered before proceeding to the narratives offered by the above-described interviewees. First, theoretical saturation was not fully achieved. The interviewees, though diverse, most certainly do not represent the *full* diversity of the American society; for example, 7 of the 8 respondents were highly educated (bachelor's degree or above), which may have had some effect on their understanding of

climate change[12]. Content analysis also has limitations, such as the unavoidable influence by the analyst's own subjective understanding and past experience in the analysis itself (Bryman, 2004). Furthermore, interviewing as a method is an "interviewer-provoked way of gathering data", and so the extent of which categories are imposed on the interviewee can influence responses and thus the data collected from those responses (Silverman, 2010, pg. 245).

Finally, narrative analysis has limitations in so far as it does not aim to represent "reality" in the realist sense; rather, it seeks to uncover the subjective interpretations of events by active subjects, which may limit its credibility, verifiability, and persuasiveness (Riessman, 2004a). In an attempt to further verify my interpretations of the various audience narratives, the full transcriptions and quotations of each interview were provided to the interviewees for review and comment.

6.2 Results: Stories from the Six Americas

As discussed above (section 6.1.4), the responses from interviewees were analyzed using the method of narrative analysis. Realizing that nearly all respondents constructed stories about their experiences, I chose to represent them in the same fashion to better highlight the diversity of interpretations. Many interviewees from the same "Six Americas" audience category had similar enough perspectives to allow me to combine them into a single narrative for that audience, though care was taken to represent the differences wherever necessary. The following narrative accounts are largely abridged due to want of space, but the most relevant and interesting aspects of each story are included, as are quotations where appropriate. Not all interviewees offered well structured narratives, so some "patch work" was necessary to get an over-view of their complete "storyline"[13].

6.2.1 The Alarmist: Gavin

Gavin is a 49 year old professor and climatologist who considers himself a moderately liberal democrat, and holds a Roman Catholic faith. Regarding his experience in 2011 (particularly the drought), Gavin told me "it was quite a year, generally nobody knew there was a [state level] climatologist until the 2011 drought", explaining that the drought was on the order of a 1 in 500 years event, with a wide ranging impact throughout the state, particularly in the agricultural sector. He categorized 2011 as a disaster year, but told me that "the positive out-weighed the negative in [his] personal life because of more days

[12] However, empirical evidence suggests that socio-economic status and level of education have little effect on people's perception of risk (see Drabek, 1986).

[13] As I guaranteed anonymity to all interviewees, I referred to each using an alias and a representative (though generic) occupation.

of golf." Drawing on his expertise, Gavin explained that "this is not the worst drought on record, you can find characteristics that were worse [than other droughts], but [not] in terms of impacts or hypothetical impacts on comparable population."

Being a climatologist by profession, Gavin gave me his professional opinion on how he saw the extreme weather affecting other people, saying "I think peoples' attitudes have changed largely in the sense of expanding their concept of what's possible. How bad it could be, whether water supplies are adequate or not." He believed that people are starting to ask more of what he called the "what's with?" questions and told me that he thought climate-related extreme weather "gives people a tangible point of reference" for the potential negative impacts of climate change.

Gavin was involved with various climate related events in 2011 (e.g. hosting lectures and discussions at various events), particularly the drought. He is completely convinced that anthropogenic climate change is real, *putting himself* in the "alarmist" category of the Six Americas typology. He actively provides climate related information to less informed groups and says he has been asked to discuss the issue more because of the natural disasters. Gavin said he views his experiences "statistically" and they therefore had little effect on his perception of climate change, which is already at a professional level and extremely unlikely to change.

6.2.2 The Concerned: Allen, Ben, and Mitch

The concerned group of respondents was the most diverse. Allen is a 32 year old Jewish graduate assistant, originally from Massachusetts, who considers himself an extremely liberal Independent. Ben is a 45 year old sports management professor, originally from Tennessee, a self-proclaimed "right-wing conservative Christian", and a loyal republican. Mitch is a 41 year old personal trainer, originally from California, and is a non-religious, moderate democrat. They all used words like "debilitating", "relentless" and "extreme" to describe their experience with the 2011 extreme weather. When describing its effects on them personally, they all explained that it had placed limitations on their daily activities; for example, Mitch explained he "would go out at night time and run because of how hot it was", while Allen explained he "didn't want to do stuff outside…why would I want to leave air conditioning to go out into 100 degree heat?".

All the respondents believed that the summer was exceptionally bad, even for Texas standards; for example, Allen said "it seems like people were telling me that this was one of the worst summers ever… even Texas veterans were, no pun intended, feeling the heat." All three of the interviewees related the

2011 weather events to what they saw as broader environmental problems; for example, Ben said "we have a problem with the environment, without question. I think that the storms are going to continue to get more violent and so forth" and Mitch explained "I think it's how we treat the environment, and the ozone layer, and all those pollutants were putting out there". Beyond the 2011 events, all these individuals believed climate change was real and a significant problem, though their certainty varied.

The reported impact of the 2011 climate-related disasters on climate change perspectives varied between these three respondents; for example, Mitch explained that his experience in 2011 had "confirmed [his position on climate change], every year they keep saying another records being set", while Allen "hadn't really thought about it, until you've made that really personal first hand contact with [climate change], it's still a little out of sight out of mind" and Ben said "when something is this dramatic, then I seek other information and sources. Now, do I do it very often? No, because it's not in the realm of what I do or what I think of very much. Am I informed as well as I need to be? No. Do I want to be informed more? Sure."

Over-all, the "concerned" respondents believe that climate change is real, but the experience of climate-related disaster was interpreted slightly differently among them, ranging from confirming a pre-existing belief, to inconsequentiality. However, all the respondents explained that no information intervention was provided, and they expressed interest in more information in order to better understand climate change and help them comprehend the relevance of such extreme events better.

6.2.3 The Cautious: Brian and Mike

The two "cautious" interviewees were quite similar, and their stories demonstrate this. Brian is a 51 year old Livestock specialist living in West Texas. He considers himself a conservative Republican, and holds a Christian faith. Mike is a 62 year old Agronomist who refused to confirm his socio-political orientation (considering it irrelevant to the discussion), though his interview responses strongly imply conservative-republican. He is also a Christian. Both Brian and Mike described the 2011 extreme weather similarly, saying "2011 was an exceptional drought year, very hot, very windy, very dry" and "we had one of the driest 12 months in recent record, ever since we have been keeping instrumental records." However, both Brian and Mike were quick to place 2011 in a broader historical context; for example, Mike explained that he had "experienced similar droughts, but not quite to this extent. But certainly we have had significant droughts. I wouldn't be doing drought as a profession if I hadn't seen droughts before"

and Brian said “the last time it was ever that dry for a 12 month period was in 1789. So, it was abnormally dry, but not un-heard of.”

In regards to their personal experience with the 2011 extreme weather, Mike and Brian both explained that it had a significant impact on their professional life, saying things like “we’ll see if livestock and ranching comes back out here because a lot of these ranches got rid of all their cows” and it was “very hectic. It just totally destroyed some of our crop and animal agriculture”. However, when discussing the 2011 year in the context of climate change, both Mike and Brian were quick to show skepticism, saying things like “the science [climate change] was based on was pretty darn weak” and “I’m a little skeptical, and a good scientist should be skeptical”. Interestingly, they both expressed a willingness to change their minds based on credible information, with Brian saying “I would hope that others would be as open minded” and Mike saying “I change my mind based on data, I don’t change my mind on a whim. We can’t just buy in because it’s convenient, or because it’s what all my friends say.”

Over-all, both Brian and Mike attempted to place their experiences in 2011 in a historical context, drawing on various kinds of climate data to support their perspectives. However, they both showed a sincere willingness to change their minds on the climate change issue if credible information were provided to them.

6.2.4 The Disengaged: Jane

Jane is a 25 year old professional softball player who considers herself a moderately liberal democrat, as well as a Christian. Jane described the 2011 year as “extreme, out of the ordinary. Whatever was happening I felt like it was extreme, whether an extreme drought, or extreme winter, or extreme heat.” The weather events had impacted her professional life in many ways and in doing so had exceeded her expectations; she explained: “It’s scary…what’s happening. It makes me change my view of like, what are we doing?” Our conversation then turned to climate change, which she says she doesn’t know enough about. She said she thinks it may be real, but explained that she “could be more informed” and “had room to grow”.

Jane saw her lack of climate change knowledge as a problem because “it’s probably how most people are”. She thinks “it first starts with being informed, and that’s kind of my own problem, that I’m not taking the time to learn or be informed more, but I feel if I knew more about it, then I could help more.” Regarding her experience in 2011, she explained she had “definitely taken notice on what’s going on, it gets me thinking more, whereas before I probably just took it for granted, and now I put more thought

into it, like what the heck's going on." When asked if anybody had come to her to speak about climate change during 2011, she said nobody had but the conversation had come up more between her and her family and friends, as well as on the news.

Over-all, Jane does not think much about climate change, the primary reason I consider her "disengaged", but her experience had a significant influence on her interest in the topic. She expressed confusion about the issue, but also a desire to know more; however, she did not know where to find credible information. She also believed that climate change may be real, but felt insufficiently informed to hold a firm position on the issue.

6.2.5 The Doubtful: Mary

Mary is a 54 year old Cattle Rancher in Central Texas, originally from Florida, who considers herself a strongly-conservative Republican holding a Christian faith. When asked about her experience with climate-related disaster in 2011, Mary began with the winter, explaining "a lot of the old timers that we talked to [said] they have never seen a winter as bad as we had. Then," she continued, "it was just the most horrible summer I have ever been through. Totally different than what we had experienced since the years we have been here." Mary went on to explain that, coming from Florida, she had expected a different climate in Texas, but the extremities of 2011 had exceeded her expectations. She explained that the extreme weather had affected her personally, but that she believed she was lucky compared to others: "We were some of the more fortunate. It was really tough on us, we had a lot of increased cost, but for other people, who basically lost everything, they are just trying to start over after last year."

When asked what she thought the main causes of the extreme weather were, Mary explained "unfortunately this was a horrible weather year, and I think that there are sometimes bad weather events. I think it's just the course of time." Moving on to the topic of climate change, Mary expressed doubt about its legitimacy, saying "I am obviously no authority on this kind of thing, but I do have an opinion. I feel like [climate change] more has become a political agenda." Mary also used an example from her property to support her doubt about climate change, saying "they predicted we would have an extremely dry year, but we have as much water on our place as we have had any year since we have been here. So, that is totally against what the predictions were."

Over-all, Mary acknowledged that 2011 was an exceptional year, but interpreted it as basically bad luck. She believes that climate change is primarily a political agenda, and supported her interpretation by referencing her experience with erroneous weather predictions. However, Mary is willing to

acknowledge she does not know much about climate change, and when asked if she was willing to discuss the topic with people she found credible, she answered "Well, yeah, I don't see why not."

6.3 Texas narratives reviewed: What can be learned?

In general, these five narratives demonstrate that different world-views can lead to variation and subjectivity in experiences between climate change audiences. Some people like Gavin (section 6.2.1), who are already counter-hegemonic, have no reason to see climate-related disaster as a shock to their expectations. However, someone like Jane (section 6.2.4), who has not thought much about climate change, may be extremely surprised by the events in 2011, and as a result, her interest and position on climate change could be strongly affected. All of these people may require extremely different approaches in order to effectively communicate something like climate change, but the almost unanimous agreement that their experiences in 2011 were "out-of-the-ordinary" shows that such a breach of expectations could act as a "tangible point of reference" for future engagement with the climate change issue. This breach of expectations and reference point create an important moment of opportunity that activists should be ready to take advantage of. But what should be done and who should do it? It is this point which brings me to the third and final research question of this thesis:

6.3.1 Research question 3:

- What do subjective interpretations of experience and different levels of understanding imply for an effective strategy to over-come the climate change cultural-hegemony in the United States?

In chapter 7, I will un-pack this research question, beginning with briefly explaining the importance of credible, relevant intervention during moments of crisis. Next, I will discuss why it is necessary to keep perspectives personal by not trying to change whole belief-system; rather, out-reach programs should acknowledge socio-culturally based subjective understandings of climate change and adjust strategies accordingly. Finally, I will briefly discuss the importance of the messenger in effectively reaching out to various audiences at opportunistic times when the obstructive cultural-hegemony is in question.

7. Curtailing Confusion: The Importance of Intervention in Times of Crisis

7.1 Keeping Perspectives Personal:

As the above narrative accounts suggest, after experiencing a climate-related disaster, many audiences can be left confused, with many unanswered questions. This is understandable, as the experience of such an extreme event may leave people feeling like the dominant climate change discourse does not line up with what they have experienced. But influencing various audiences can be tricky business, as interpretations of experience are highly subjective. Leaving information dissemination to the prestige press or politicians is undesirable, as it can not only distort the truth around an issue, it can actually reinforce the obstructive cultural-hegemony (see section 2.1 and chapter 3). Hoffman (2011) has argued that overcoming the socio-political divide in the United States is a significant obstacle to achieving a social consensus on climate change. Should activists promoting a social consensus try to change the value systems of individual Americans as a means to this end? Hulme (Hulme, 2009) argues no, as a plurality of value systems may provide more, and timelier, opportunities for change. For example, in the above described *Concerned* audience (section 6.2.2), Ben and Allen have generally the same beliefs about climate change, but for very different reasons (i.e. religious and political, respectively). Reconciling those differences may not be necessary to encourage their support for various kinds of action, if it is even possible.

Along with value systems, the level of awareness and understanding of individuals should also be considered and respected. As the Texas narratives (and survey data; see for example Leiserowitz *et al* (2011)) demonstrate, there is a rather wide spectrum of how informed individual Americans are about climate change. Mary (section 6.2.5), for example, considers herself not very well informed about climate change yet maintains a rather strong skeptical position about the issue; Brian (section 6.2.3), however, claims to know a lot about climate change but is undecided on his position. Appropriate information for various levels of understanding, as well as specific socio-political and cultural beliefs, is important for fostering support for a range of solutions (Chess, 2007). Allowing people to maintain their core values and adjusting intervention strategies to consider and respect those values may prove to be the most plausible means of fostering any kind of counter-hegemonic social consensus. This may be more easily achieved if the messengers are considered credible by the target audiences.

7.2 The Need for a Credible and Relevant Messenger:

According to Chess (2007, pg. 230) "the importance of credible communicators and early adopters has not yet been empirically examined in the climate change field", but examples from various other fields help demonstrate the concept. To exhibit the importance of a credible messenger, Chess (2007) juxtaposes two examples from the health field: one example of success where, after many failed attempts to get a practitioner of female genital mutilation to stop, Womankind Kenya (an NGO) convinced religious clerics with high credibility among villagers to take up the cause instead, resulting in a very positive outcome (citing Lacey, 2004); and another example of failure where, due to a lack of credibility in the village and the early adoption of their suggestions by low status village members, health workers were unable to convince the vast majority of residents in a Peruvian village to boil their water to avoid water-borne disease (citing Rogers, 1962).

In the field of Risk Analysis, Slovic (1999) has suggested that credibility (i.e. trust) in the messenger leads to an increase in trust of the message, and therefore can heavily influence perceptions of risk. More related to my analysis, Haag (2006) has argued that an increase in support from evangelical leaders in the United States, as credible messengers for millions of Christians in the country, could act as a "powerful social force" for promoting action on climate change. E. Weber (2010) has also argued that, among other things, the credibility of the messenger is an important factor in shaping perceptions of climate change. From the Texas narratives, it may be obvious that someone like Ben, a self proclaimed right-wing conservative Christian, would not find a leading democratic figure (e.g. Al Gore) as credible a messenger as a respected conservative or religious figure; likewise, a cattle rancher like Mary, who expressed a distrust in predictive science, may not find more scientific information credible unless it comes from a respected and relevant individual or organization, for example the Texas and Southwestern Cattle Raisers Association (TSCRA, 2011). Though this idea has not yet been empirically tested in the context of climate change, all these examples show that there is very good reason to believe that the credibility of the messenger, and their relevance to a particular audience, must be sincerely considered when intervening in someone's subjective understanding of a complex issue like climate change, and are therefore very important in initiating a counter-hegemonic social consensus in the United States.

As I have shown, when individuals and groups are making decisions heavily based on socio-political orientation, religious beliefs, personal experience, or inaccurate knowledge, effective strategies aimed

at surmounting barriers to social support for action can be touchy. The previous several sections were meant to demonstrate the need for context specific, socio-culturally sensitive strategies when engaging various audiences about complex, and often controversial, sustainability challenges like climate change. In chapter 8, I will elaborate the implications of this research for activism and academia, offering suggestions for improving existing and future activist strategies as well as for the future of Sustainability Science research.

8. Broader Implications and Directions for Future Research:

8.1 Implications for Climate Change Activism:

The implications of the various themes discussed in this thesis are many for both activism and academia. Climate change activists thus far have relied almost solely on traditional routes for achieving social transformation, such as education, political protest and civil disobedience, and media and entertainment outlets. These approaches are largely captured in the information deficit and discourse models previously discussed (see sections 3.1 and 3.2, respectively). Though these models are in many ways useful, activists would do themselves a great service by recognizing the severe limitations of these approaches when implemented on their own. Neither standard information dissemination nor a discursive struggle will be sufficient to achieve the ambitious goals set out by many activists and organizations because they do not address the drivers of inaction specifically and/or rely on communication techniques which others have more resources and control over (i.e. media outlets). Instead, uncovering and exploiting synergies between various techniques and strategies may prove the most effective way of achieving meaningful social change in the United States.

Chapters 6 and 7 advance the claim that activist strategies should be acutely aware of the socio-cultural characteristics of the audiences they are engaging, how different messengers may appear in the eyes of these various audiences, and when the most appropriate or effective times for engaging these audiences are. Chapter 5 discussed an example of the most opportune times for intervention (i.e. climate-related natural disasters), but these examples are not exhaustive of all possibilities and the last thing activists should do is sit around and wait for natural disasters to happen. Instead, the emphasis on "events" more generally implies that activists should be aware of the opportunities for change that lay *outside* the normal social interactions and be ready to take advantage of those opportunities when able.

Based on the particular context and audiences engaged, activists must be willing and able to adjust the timing, information output and intensity, and appropriate messengers associated with their various outreach and intervention strategies. In this respect, the knowledge developed in this thesis is *actionable* and could be usefully incorporated into existing and future strategies as a complement to other approaches like those offered by the deficit and discourse models. The model developed in this thesis is *not* a panacea and should not be taken as such; rather, it is intended to contribute to the development of an improved strategy for overcoming the barriers to social action on complex sustainability issues like climate change in the United States.

It is incredibly important to recognize that, though I have pushed beyond the mainstream perspectives that refer to political will, information deficits, and ideology and discursive struggles to explain and overcome the obstructive social attitude towards climate change in the United States, these models and their related approaches have a very important role to play in effecting real-world change. The need to provide scientific information through the widest reaching outlets (i.e. Television, Internet, and Radio) should continue to be strongly promoted as should the constant and persistent pressure applied to political elites and decision makers to take issues like climate change seriously and act accordingly. These approaches are particularly important in this age of cyber space and social media, where massive coalitions can be electronically amassed like never before. Engaging and influencing actors at all levels of organization is pivotal to facilitating meaningful social change.

8.2 Implications for Sustainability Science:

A recent appraisal by Wiek *et al* (2012b) examined the progress of the first decade of sustainability science (introduced in section 1.1) and concluded that there are some deficits in fulfilling the goals of this ambitious agenda, particularly in respect to stakeholder participation, actionable results, and large impacts. In order to over-come these deficits, sustainability scientists must take an approach that emphasizes the development of knowledge that is relevant to people's decision making, engages problems and areas where power dominates understanding, and encourages students and practitioners to confront real-world situations and challenges by leaving the comfort of the classroom and interacting with actors on the ground (Wiek *et al*, 2012a).

This is particularly true for a complex sustainability challenge like climate change which, as I have shown in the United States context, may be dominated by a cultural-hegemony that imposes power over understanding. The strategies for overcoming deep-seated barriers like cultural-hegemony must be aimed at the socio-cultural level and remain context and culturally specific, something that requires direct engagement with various actors and audiences on the ground. Since traditional mono-disciplinary research strategies are generally ill-equipped to fulfill these needs, promising approaches to surmounting such challenges may come from various trans-disciplinary, action-oriented approaches (Max-Neef, 2005; Thiollent, 2011) discussed below.

8.2.1 The Trans-disciplinary Approach:

"Trans-disciplinarity is a reflexive, integrative, method driven scientific principle aiming at the solution or transition of societal problems and concurrently of related scientific problems by differentiating and

integrating knowledge from various scientific and societal bodies of knowledge" (Lang *et al*, 2012, pg. 27). The notion of trans-disciplinary research has been gaining significant attention in recent years, as it is believed to simultaneously meet the needs of both real-world problems and the transformational agenda of sustainability oriented research (Klein *et al*, 2001; Brundiers *et al*, 2010; Lang *et al*, 2012). Scholz *et al* (2006) maintain that trans-disciplinary case-studies in particular could provide useful means for improving sustainability learning. Crate's (2011) trans-disciplinary investigation into the shifting cultural perspectives of climate induced water-regime change among cattle ranchers in Siberia, Russia, provides a relevant demonstration of how this research approach can facilitate understanding and incorporation of socio-cultural dimensions of decision making into solution strategies, which may ultimately lead to superior practices and policies, in Crate's case for water management. Wiek (2007) also offers case-study examples demonstrating the usefulness and effectiveness of a trans-disciplinary research approach in various contexts. However, trans-disciplinary research is not without its problems.

Effective knowledge generation between various scientific and non-scientific actors can prove challenging and may require epistemological mediation (i.e. via an "epistemediator") to reconcile differences in agendas, values, and data prioritization, among other things (Wiek, 2007). Resolving the problem of mediation may be achieved through the five key competencies that Wiek *et al* (2011a, 2011b) claim are necessary to facilitate effective sustainability research and real-world action; they include systems-thinking, anticipatory, normative, strategic, and interpersonal competencies. These five broad competencies could provide a strong foundation for effective "epistemediation" in collaborative research projects, placing the sustainability researcher, and Sustainability Scientist in particular, in a fortunate position to actualize the full potential of trans-disciplinary research strategies.

8.2.2 The Action Approach:

Another related research approach that could prove synergetic with trans-disciplinary research in achieving the goals of Sustainability Science is action research. Though there is no single type of action research, it is loosely defined as "an approach in which the action researcher and a client collaborate in the diagnosis of a problem and in the development of a solution based on the diagnosis" (Bryman, 2004, pg. 277). More specifically, action research is "a dynamic process that develops from the unique needs, challenges, and learning experiences specific to a given group" where "methods and modes of action are formed over time through dialectic movement between action and reflection" (Kidd, 2005, pg. 187). Over the last decade, various forms of action research have (re)emerged and proven useful in simultaneously generating valuable scientific knowledge while effectively advancing positive social and

environmental change (Brydon-Miller, 1997; Gatenby, 2000; Cahill, 2007; Ballard, 2010). Stokols (2006) has even proposed a unified science of *trans-disciplinary action research*, with the ambition of further advancing the opportunities for scientific advancement and societal improvement posed by these two extremely promising research approaches.

Though many other related approaches may provide appropriate means for achieving the development of actionable, relevant knowledge for real-world change, such as community-based, participatory, and interactive approaches (Lang *et al*, 2012), due to want of space I have only discussed trans-disciplinary and action research specifically as they are more broad and may in some ways encompass these other approaches; however, these other related approaches deserve ample attention in future research endeavors.

8.3 Further Research:

A similar research approach to the one found here within which 1) transcends boundaries and utilizes knowledge from all relevant academic disciplines and non-academic sectors 2) emphasizes the development of conceptual models that help clarify the deep-seated drivers of inaction, and 3) creates actionable knowledge for overcoming these challenges, should be a major priority in future research endeavors. Furthermore, the themes discussed throughout my thesis raise several related questions that could direct research in the future, for example:

- What are the most promising types of intervention and what approaches and strategies could increase their effectiveness?
- What other various types of "events" may provide promising opportunities for social change?
- What are the various mechanisms for the establishment and maintenance of an obstructive/productive cultural-hegemony?
- What conflicts/synergies exist between different techniques and strategies for facilitating social change and how can they be avoided/exploited?

Future researchers should address these broad questions in a wider diversity of countries, social and cultural contexts and with other sustainability challenges (e.g. biodiversity loss, deforestation, violent conflict, etc) in order to further develop a more comprehensive understanding of the barriers to and opportunities for holistic sustainability. There is a serious need to understand the mechanisms that work to establish obstructive social structures like the United States cultural-hegemony as well as what the

most desirable paths are once such social structures are overcome. A healthy debate already exists that seeks to promote the best trajectory for the future of humanity, including well known paradigms like ecological modernization or the post and de-growth movements. Developing a comprehensive picture of the problem mechanisms, best solutions, and future directions of society is perhaps the only way of overcoming the seemingly insurmountable challenge posed by un-sustainability.

The promising research strategies exemplified by trans-disciplinary and action oriented research can be of significant utility in this regard, and should continue to be developed and adopted by sustainability oriented researchers and agents of change in civil society. It is also important to recognize that traditional mono and inter-disciplinary research approaches should not be *replaced* by trans-disciplinary or action-oriented research. Instead, comprehensive understanding of complex sustainability challenges should be *enhanced* through the exploitation of *synergies* derived from the combination of various research approaches, what Spangenberg (2011) calls the sciences *for* sustainability (disciplinary) and sciences *of* sustainability (trans-disciplinary).

Final Thoughts:

Climate change is one of the best examples of how intricately linked the ecological and social systems are on this planet. Addressing such complex challenges is the necessary burden of our generation, and a heavy one at that. Research fields like Sustainability Science are in a prime position to bring together the best of advanced knowledge and understanding with the motivation and determination of civil activists and agents of social change. But this cannot be done from within the confines of the Ivory Tower. Practitioners of action-oriented and normative sciences like Sustainability Science should emphasize addressing the *drivers* of social ills, rather than solely the *symptoms*, and must be willing and able to collaborate with all relevant and available help from within and outside academia. Partnerships that simultaneously engage and transform social structures while also contributing to the scientific quest for understanding can be the beneficial end-product of effectively bridging the gap between science and society. The next decade of Sustainability Science research should be even more exciting than the first decade. The opportunities that exist for blurring the boundaries between science and activism should not only be recognized, but celebrated for their indispensible contribution to the continuing march towards a more just and sustainable world.

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Appendices:

Appendix A: Verbal Personal Characteristic Questionnaire

Examples of questions asked about interviewees personal characteristics

What is your age?

What is your annual income? Under $25,000, Between $25,000 and $50,000, Between $50,000 and $100,000, or over $100,000?

What is your highest level of education?

What is your current profession?

What is your preferred political orientation (e.g. republican or democrat)?

What do you consider your social orientation (e.g. conservative or liberal)?

Are you religious? What religion? How often do you do religious activities?

Do you consider yourself politically active? How often?

Do you consider yourself civically active? How often?

Appendix B: Climate-related Disaster Experience Interview Guide

Examples of questions regarding personal experience with climate-related natural disasters in Texas

What do you think about the weather events in 2011?

What comes to mind when the weather in 2011 is brought up?

Did you hear people talking about the weather events in 2011? Who? Where? What were they saying?

Did the extreme weather events last year (2011) impact you personally? Why/why not?

Did you experienced any weather events/ conditions that you think were out of the ordinary?

Have you ever experience anything else that compares to your recent experience?

Over the past year, do you believe you have experienced a natural disaster? What makes it/does not make it a disaster?

Do you believe past generations (e.g. parents or grandparents) experienced similar extreme weather? More or less often/severe?

Do you believe future generations (e.g. parents or grandparents) will experience similar extreme weather? More or less often/severe?

What do you think the main cause of the 2011 extreme weather is/was? Why?

Appendix C: Personal Perspectives on Climate Change Interview Guide

Examples of questions regarding interviewee's personal perspectives and beliefs of climate change

Opinions and Beliefs:

What do you think about climate change? Do you think it is happening? How sure are you?

How much have you thought about climate change? How important is it to you?

Do you ever worry about climate change?

How informed do you consider yourself about climate change? What do you see as the main cause?

Do you think scientists agree about climate change?

Do you think climate change poses a threat to humans? To you personally? To future generations?

Did your experience last year affect your opinion about climate change? Why or why not?

Actions and Intentions:

Have you ever taken political action to address climate change?

Have you ever taken consumer action to address climate change?

Have you taken any community action to address climate change?

Do you discuss climate change with others? Who? When?

Do you plan to do any of these (previous 4 questions) more in the future? Why/Why not?

Information and Media:

Do you actively seem information about climate change? What kinds of sources do you trust?

How much attention do you pay to new coverage? What kind of media?

Do you plan to do any of these (previous 2 questions) more in the future?

Expectations and preferences for action:

Do you think taking action on climate change would help or harm the current generation? Future generations? Nature?

Do you think private or government action to address climate change could make a difference?

Do you think climate change should be a high priority for individuals or government?

Would you support a corporate and national response to climate change? What kind?