Value Systems and Environmental Policy: Cultural and Environmental Cognition and Climate Change Risk

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Introduction

Why is there disagreement about the risks posed by climate change? The vast majority of climate scientists agree about the basics of climate change–that the average temperature of the earth is warming due largely to human activity and, as a result, there will likely be long-term negative consequences–however some elected officials and many in the public view the science surrounding climate change as far from settled and/or view the risk as negligible. The reason for the disparities in views about climate change are not because one side of the debate rejects or denies science or the scientific method, both sides try and claim that the science is on their side rather than the other. Rather, as noted by Hoffman (2015), climate change debates are not about science as much as they are "about opposing cultural values and worldviews through which that science is seen" (5).

Disagreements over environment policy issues broadly, and climate change specifically, are often based in differences in values. Values determine an individual's ideas about right and wrong, and are typically resistant to change. According to S. H. Schwartz (1992), "Values (1) are concepts or beliefs, (2) pertain to desirable end states or behaviors, (3) transcend specific situations, (4) guide selection or evaluation of behavior and events, and (5) are ordered by

relative importance" (4). Values shape and constrain beliefs, where beliefs are things that are thought to be true. Finally, values form the basis for attitudes, which are evaluations, positive or negative, about specific issues (Dietz, Fitzgerald, and Shwom 2005, 346).

Values are organized in a hierarchical system where general, broadly applicable, values constrain more specific policy attitudes (Peffley and Hurwitz 1985; Sabatier and Jenkins-Smith 1993). Values systems form a causal chain from abstract values to policy domain-specific values, and finally to policy issue-specific attitudes. The most broadly applicable values are termed core values, and include such values as political ideologies, altruism, traditionalism, individualism, and egalitarianism. Core values help define domain-specific values, such as those that deal with the ethics associated with the management of natural resources. Finally, core and environmental values constrain attitudes about issues like land management, energy production, and climate change.

The most notable role that values play in environmental disputes is the ways in which they shape our cognition, or how we think about environmental policy issues and how we process information pertinent to political and policy debates. Typically, policy attitudes are motivated by a desire for congruence with values, rather than a desire for accuracy (Kunda 1990). As a result, we tend to only accept information that comports with our values. Values provide clarity in the face of complexity, and reasoning is often a post-hoc value-based justification (Haidt 2001).

The cognitive function of information processing can be understood through a *two systems* model, system 1 and system 2, of cognitive processing. System 1 "operates automatically and quickly, with little or no effort and no sense of voluntary control", whereas system 2 processing "allocates attention to the effortful mental activities that demand it, including complex computations" (Kahneman 2013, 20–21). Both systems can operate to determine policy attitudes with system 1 processing deriving heuristic-based attitudes and system 2 deriving carefully reasoned, evidence-based attitudes. As noted, reasoning is often employed after some initial judgment has been made likely through system 1 processing. Therefore, system 2 reasoning often provides justification for the conclusions reached through system 1 processing.

This chapter explores the nature of value systems and their importance in shaping environmental policy disputes by examining how the public translates values into policy attitudes.

First, this chapter delineates the hierarchical structure of value systems. Then, core values and environmental values are explained. Next, the cognition function of values are discussed. Finally data from a survey of residents from South Carolina's eight coastal counties is used to demonstrate the influence of core values and environmental values on the perceived risks of climate change.

Value System

Values and beliefs can be understood to be organized within a system that is hierarchically structured from broadly applicable notions of right and wrong to attitudes about specific issues. Values at one level of the hierarchy influence, or constrain, values at the next level. At the broadest level and therefore the most far-reaching in terms of influence are *core* values. Following core values are domain-specific values, such as environmental values that concern the relationship between humans and the natural world. Finally, policy attitudes are evaluations about particular policy issues and include preferences about what policy issues government should address and how they should address them. Figure 1 illustrates the value system structure.

Figure 1: Hierarchically Structured Value System

The hierarchical structure of values implies a consistency across each level. For example, if left-leaning political liberalism is an individual's core value than they are likely more likely to support government regulations that restrict pollution. In addition, values not only influence specific policy attitudes, but may also shape pro-environmental behavior among members of the public (Stern 2000; Stern, Dietz, and Kalof 1993). Finally, values can play a role in the formation of coalitions of policy actors, where actors coordinate activities based on shared beliefs at the domain-specific level (Jenkins-Smith et al. 2014; Sabatier and Jenkins-Smith 1993). The next section examines core values.

Core Values

Core values are foundational values that span multiple policy domains, and include "fundamental normative assumptions about human nature and the relative priority of values such as liberty, security, and equality" (Ripberger et al. 2014, 509). With regard to policy debates, the most publicly visible and openly discussed core values are political ideology and partisanship. Media coverage of politics and statements from elected officials often make use of political ideology–conservative vs. liberal–to infer a wide range of policy attitudes. Political parties are coalitions of differing regional, ideological, and interest group factions, and they play a key role in enabling coordination among various actors. Over time, but particularly since the civil rights movement, there has been an increasing alignment between ideology and political parties, with liberals becoming associated with the Democratic party and conservatives with the Republican party (Abramowitz and Saunders 2006). As parties and ideologies became aligned, polarization tended to increase, particularly with regard to contentious issues like climate change.

Political ideology is thought to exist on a single dimension from liberal (left) to conservative (right), and ideological disagreements tend to be about the size, scope, and nature of government. Disputes about the size of government are related to taxes, spending, and the overall size of the federal budget. Scope refers to disagreements over what belongs in the public vs. the private sphere, and what types of behavior should or shouldn't be regulated by government. Finally, disputes about the nature of government center around whether or not government is viewed as a vehicle for collective decision-making or as a non-representative entity that imposes rules.

Each of the aspects of government can be seen within environmental policy disputes that are fought across ideological and partisan divisions. For example, a larger government has more capacity to monitor environmental conditions and find problems that may require government action, thereby increasing the role of government. The process of increased monitoring leading to increased government action has been termed the paradox-of-search (Baumgartner and Jones 2015). Typically, liberals and Democrats are more accepting of a larger government than are conservatives and Republicans.

Environmental policy disputes also involve questions of the scope of government, particularly in regard to questions of market failures and the regulation of business practices that might

have negative environmental consequences. Should governments put a regulatory regime in place to address common-pool resources, as liberals and Democrats may support or should governments simply demarcate property-rights and then allow market forces to address common-pool resources, a policy likely favored by conservatives and Republicans?

Questions regarding the representative nature of government are also present in environmental policy issues. For example, disputes over land management and ownership in the western U.S., which led to the Sagebrush Rebellion, illustrate the tension between a federal government that is seen as far removed and unrepresentative of local interest and local governments that are understood to be "closer" to the people and therefore more representative. The representative nature of government is particularly salient with regard to the relationship between elected officials and bureaucrats working within executive branch agencies. The bureaucrats that develop regulatory policy are often seen, typically by conservatives and Republicans, as usurping policymaking authority that is within the purview of elected officials. As environmental policy developed from the environmentalism era these differing views of government have led increased partisan gridlock.

The construction of the green state that took place during the "environmental decade" of the 1970's was largely bi-partisan, with both Republicans and Democrats supporting environmental legislation. However, since that time the two major political parties have increasing diverged on environmental policy issues, and this is reflected by both elected officials and the public (Calvert 1989; R. E. Dunlap, Xiao, and McCright 2001; A. M. McCright and Dunlap 2013; Shipan and Lowry 2001).

The basis of political party divisions are largely connected to views about the size, scope, and nature of government. These cleavages started to become closely connected to environmental policy disputes with the election of Ronald Reagan (Calvert 1989). Beginning in the early 1980's, Republicans became associated with the view that government regulation in general, and environmental regulation in particular, leads to slower economic growth. In addition, Shipan and Lowry (2001) found that the increasing differences in environmental votes across political parties in Congress from 1969 to 1999 was a result of fewer southern Democrats, an increase in environmental interest group membership, decreased salience of environmental issues, economic conditions, turnover in Congress, and increases in overall ideological (left-right) divergence.

These results point to the importance of ideological cleavages and other fractures within and across the coalitions of the two major parties, as well as external conditions such as economic growth, interest group representation, and public opinion.

Much like elected officials, the public has become divided along partisan lines regarding environmental issues. In general, the policy attitudes of the public align along a single dimension of ideology only for those that are engaged and knowledge about political issues (Kinder and Kalmoe 2017). However, political parties act as important cues for the mass public and as elites have become more polarized that has sent strong signals to the public, allowing the public to sort themselves along partisan lines (Levendusky 2010). This can be seen in the increasing polarization among the public between self-identified Democrats and Republicans regarding spending on the environment. Figure 2 uses data from the General Social Survey from 1973 to 2016 to illustrate partisan differences on the environment.

Figure 2: Public Opinion on Environmental Spending by Party: 1973–2016

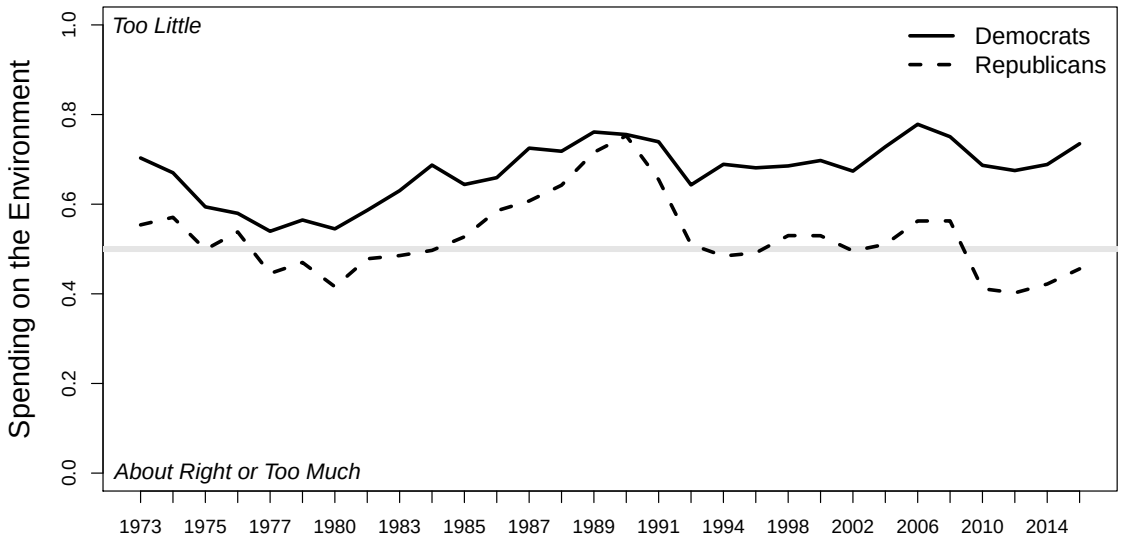


Figure 2 shows the mean of environmental spending, where 1 indicates "too little" and 0 indicates "too much" or "about right" for self-identified Democrats and Republicans.[1] As can be seen, partisan differences were present for most years however, the differences between the parties seemed to have been growing since the early 1990's.[2] While partisan polarization on the environment started in the late 1970's and early 1980's among elites, among the public

[1]This measures includes independents that lean towards one party.

[2]For a statistical analysis of this data see A. M. McCright, Xiao, and Dunlap (2014).

it has been increasing since about 1993 when the Republicans won control of the House of Representatives.

Apart from political values, other types of core values have been identified. For example, Values-Beliefs-Norms (VBN) theory posits that pro-environmental attitudes and behaviors follow from core values to environmental beliefs, then to norms, and finally to behavior. Various iterations and applications of VBN have applied different sets of values, but some of those that are consistently applied include altruistic, biospheric, egoistic (self-interest), traditionalism, and openness to change (Dietz, Kalof, and Stern 2002; Henry and Dietz 2012; Stern 2000; Stern et al. 1999). Applications of VBN theory have consistently found that core values are predictors of environmental attitudes and behaviors however, a consistent set of measures of core values that has a strong theoretical grounding as well as valid measurement is preferable. One such theory is *cultural theory*, which was initially developed by anthropologist Mary Douglas, with important contributions by political scientist Aaron Wildavsky (Douglas and Wildavsky 1982; Wildavsky 1987).

Cultural theory provides a general structure for value orientations, based on dimensions of sociality, that can encompass a range of other core values like political ideology and partisanship as well as biospheric altruism and traditionalism. This allows cultural theory to act as a single underlining theory of core values (Ripberger et al. 2014). Acting as a measure of core values, cultural theory has been found to be a strong predictor of public opinion regarding several scientific and technical issues including the risks and benefits associated with vaccines (Song 2014); the risks associated with nuclear waste (Jenkins-Smith 2001); and the public's views on nuclear weapons and the threat of terrorism (Ripberger, Jenkins-Smith, and Herron 2011). Finally, cultural theory posits myths of nature that define how individuals view the natural environment and has been demonstrated to be an important predictor of environmental attitudes (R. J. Ellis and Thompson 1997; Steg and Sievers 2000) and views about climate change (Goebbert et al. 2012; M. D. Jones 2011; Pendergraft 1998). The next section examines cultural theory, the ways-of-life it posits, and the associated myths of nature.

Cultural Theory

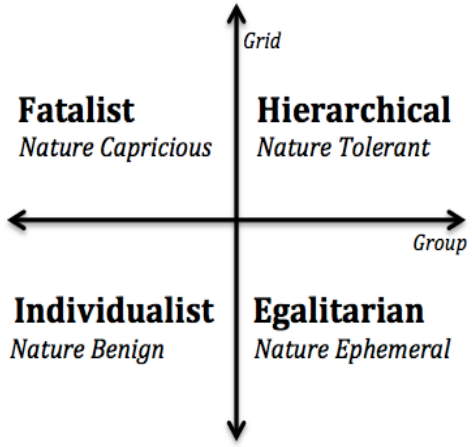
Cultural theory posits that core values stem from orientations based in *social relations*–patterns of interpersonal relationships–that structure *cultural biases*, where values are shared among individuals. Culture bias and social relations combine to form viable "ways-of-life", or cultural types. Individuals derive domain-specific values and policy attitudes that follow from, and therefore support, their preferred cultural type (M. Thompson, Ellis, and Wildavsky 1990).

The groupings that determine the various cultural types exist along two dimensions, a grid dimension and a group dimension. The grid dimension concerns the degree to which individuals are constrained by rules, consigned to particular roles, and have little ability to negotiate their position. As noted by Douglas (2003), "In a high-grid environment, everything is classified and individual choice is heavily restricted" (1352). The group dimension refers to how important it is for individuals to be integrated within groups. In high-group contexts, individual needs become subservient to the well-being of the group. Combining the grid and group dimensions produces four cultural types, or viable ways-of-life, including hierarchy, egalitarianism, individualism, and fatalism.

Cultural types provide a basis for core values by anchoring individuals to how social relationships *should* be structured. Adherents to the various cultural types form views about specific policy issues based on consistency with their notions of idealized social relationships and the bias that those relationships represent. With regard to environmental issues, the values inherent in each of the four cultural types are associated with four respective myths of nature. The four myths of nature are based on the perceived stability of the ecosystem, which then provide guidance for how human should interact with the natural world. Figure 3 illustrates the four cultural types and their corresponding myth of nature.

Hierarchical: The hierarchical cultural type is high on both the grid and group dimension, therefore hierarchs value group cohesion and solidarity coupled with clearly defined roles and delineated authority within the group. For hierarchs, clear lines of authority within bounded groups create the most harmonious societal arraignment. With regard to nature, hierarchs view nature as tolerant. The nature tolerant myth implies that nature provides resources for human development, but the extraction of those resources should be carefully managed by experts and the benefits distributed according to the social orderings of the hierarchy.

Figure 3: Cultural Theory and Myths of Nature



Egalitarian: Egalitarians are low are the grid dimension and high on the group dimension and, as a result, egalitarians prefer group cohesion and equality among group members. Being low on the grid dimension means that egalitarians reject social stratification among group members. For egalitarians nature is seen as ephemeral, or transient, and therefore vulnerable to human activity. Since we can't be sure of the permanence of nature, it should not be disturbed.

Individualist: Individualists are low on both the grid and group dimension, therefore they prefer societies where individuals are free compete and negotiate with each other without the constraints of group cohesion or authority. For an individualists, nearly all aspects of society should resemble a market so that merit, determination, and hard work are properly rewarded. Individualists see nature as benign and forgiving. Since nature is robust to the impacts of humans, we should exploit its resources in support of entrepreneurial activity.

Fatalist: The fatalist cultural type, also termed isolates (Douglas 2003), are low on the group dimension, meaning that they typically value little, to no, group attachments. However, fatalists are also high on the grid dimension, therefore they are likely feel as though their choices are constrained by the social stratification that is externally imposed and beyond their control. Fatalists typically exist within groups that are marginalized by the larger society, and as a result withdraw from participation in collective action. The fatalists view of nature is that nature capricious and therefore unable to be controlled, or perhaps even fully understood, by humans.

Large, diverse societies produce a cultural plurality where competition among the different cultural types exists (B. Schwartz 1991). As noted by R. J. Ellis and Thompson (1997) "environmentalism has become enmeshed in a culture war between individualists and egalitarians" (183). The culture war competition is driven not just by the core values exemplified by cultural theory but also environmental values associated with the myths of nature. The next section examines environmental values.

Environmental Values

Apart from core values, environmental policy disputes are also based on differences in environmental values, which concern the "appropriate relationship between humans and the natural world" (Layzer 2012 ,2). Environmental values are connected to the various myths of nature that are derived from the four cultural types. In addition, environmental values encompass a wide variety of beliefs however, environmental values can be represented as existing along a single dimension that roughly divides into two factions. On one side of the divide are *environmentalists* that view nature as having intrinsic worth and in need of protection from human activity. Environmentalists are most likely to accept the nature ephemeral myth associated with egalitarianism however, some environmentalists may accept the nature tolerant myth of the hierarchs. At the other end of the continuum are what Layzer (2012) terms *cornucopians*, which view nature as an abundant source of resources for human development. Cornucopians are likely to be individualistic and view nature as benign however, some may also see the importance of hierarchy and careful management of natural resources. Since environmental values are largely about the relationship between humans and nature, specifically the impacts on nature that relationship may have, the fatalist myth of nature capricious is not considered an environmental value. Rather, the nature capricious myth is a result of the lack of agency that is generally felt by fatalists.

As discussed in chapter 1, early environmental values included preservationists, such as John Muir, that felt nature needed to be preserved and protected from human interference, and therefore should be left untouched. Strands of the preservationists ethos are present within many environmentalists groups and individuals arguing for increased environmental protection. Preservationists are closely associated with the nature ephemeral myth of the egalitarians. In

addition to preservationists, conservationists were also considered to be early environmentalists. Conservationists, like hierarchs, believe that natural resources can, and should be, properly managed to ensure their sustainability. Environmentalists vary in the degree to which they tend to be preservationists or conservationists.

On the other side of the environmental values divide are the cornucopians, and their focus is on the betterment of human societies through economic growth, technological innovation, and individual liberty. Nature, for the cornucopians, is there to provide resources and has little added value on its own. For much of U.S. history the cornucopian ethos has been the dominant social paradigm for understanding the relationship between humans and nature (Dunlap and Liere 1984). The cornucopian view is present in those arguing for less environmental regulation. For example, in January 2017 White House press secretary Sean Spicer during his first press conference responding to a questions about the Keystone XL and Dakota pipelines stated that:

> The energy sector and our natural resources are an area where I think the president is very, very keen on making sure that we maximize our use of natural resources to America's benefit. It's good for economic growth, it's good for jobs, and it's good for American energy.[3]

The focus on economic growth, jobs, and domestic energy production is very much in line with the cornucopian, as well as the nature benign, view of nature. Whereas, an environmentalist view of nature sees the focus on development as a threat to the natural world as well as highly likely to exacerbate climate change. The diverse views of cornucopians and environmentalists can be seen as two points on a unidimensional scale of environmental values. The underlying unidimensional values that constitute cornucopians and environmentalists has been successfully measured by the New Ecological Paradigm scale.

The New Ecological Paradigm (NEP) scale measures "beliefs about humanity's ability to upset the balance of nature, the existence of limits to growth for human societies, and humanity's right to rule over the rest of nature" (Dunlap et al. 2000, 427). It has been widely used as a measure of environmental values. The 15 questions that constitute the NEP scale are presented in Table 1. The column on the left shows questions that align with cornucopian, or

[3]Full transcript available here: https://www.washingtonpost.com/news/the-fix/wp/2017/01/23/sean-spicers-defense-of-himself-and-explanation-of-donald-trumps-sensitivity-annotated/?utm_term=.4cea9dc188b5

dominant social paradigm, values and the column on the right are the questions that align with environmentalists values.

Table 1: New Ecological Paradigm Questions

Dominant Social Paradigm	New Ecological Paradigm
Humans will eventually learn enough about how nature works to be able to control it	Despite our special abilities, humans are still subject to the laws of nature
The balance of nature is strong enough to cope with the impacts of modern industrial nations	Humans live on a planet with very limited room and resources
The Earth has plenty of natural resources if we just learn how to develop them	Plants and animals have as much right as humans to exist
Human ingenuity will insure that we do not make the Earth unlivable	Humans are seriously abusing the environment
Humans were meant to rule over the rest of nature	The balance of nature is very delicate and easily upset
Humans have the right to modify the natural environment to suit their needs	If things continue on their present course, we will soon experience a major ecological catastrophe
The so called "ecological crisis" facing humankind has been greatly exaggerated	When humans interfere with nature it often produces disastrous consequences
	We are approaching the limit of the number of people the Earth can support

As shown, the dominant social paradigm is based on ideas how humans can control nature, were meant to rule over nature, and will make the nature world sustainable through human ingenuity. Environmentalism is associated with the consequences of human interference, the balance of nature, and the limited resources of the earth.

The values associated with the cornucopians and environmentalists represent a single dimension that overlaps with the nature benign and nature ephemeral myths. The nature tolerant myth of the hierarchs is most closely associated with conservation. Conservation deals with the way that natural resources should be managed to ensure their sustainability. Most environmental policy debates use the rhetoric of conservation, which may indicate that both sides accept some degree of development, coupled with some preservation. Disagreements arise around the trade-offs associated with development and conservation.

Core and environmental values work to shape the way that environmental policy issues are understood and defined in policy debates. The next section describes the mechanisms through

which values operate to shape policy attitudes. In addition, the next section explores the connection between core values, environmental values–as measured by the NEP scale–and the perceptions of risk associated with climate change.

Cultural and Environmental Cognition

Values nested in value systems play a key role in determining specific policy attitudes by guiding the way that individuals reason about particular issues. A large body of research has examined the heuristics and other cognitive processing short-cuts that individuals use when considering complex policy issues. Value-based reasoning, where individuals use system 1 processing to quickly access policy relevant information based on the implications of that information in light of their values. For example, an individualist is likely to reject information about the risks of climate change if the implication of accepting that information is a need for government regulation of economic activity. Drawing on the values derived from cultural theory and social psychology research on cognitive processes, scholars have developed the theory of *cultural cognition*.

According to cultural cognition, cognition is used to align specific policy attitudes with the various sets of values, rooted in the cultures derived from cultural theory, that individuals hold. Specifically, cultural cognition holds that, "individuals, as a result of a complex of psychological mechanisms, tend to form perceptions of societal risks that cohere with values characteristic of groups with which they identify" (Kahan et al. 2012, 732).

Cultural cognition is rooted in cultural theory, however, it conceptualizes cultural ways-of-life in a different way. As opposed to deriving the four cultural types from the grid and group dimensions, cultural cognition sees the grid dimension as a continuum from hierarchy to egalitarianism and the group dimension as a continuum that ranges from individualism to communitarianism. Table 2 shows the survey questions associated with each scale.

The questions in Table 2 have been used to determine cultural identity across a range of studies. While the scales have the potential to determine four cultural types, the majority of studies orientate individuals as tending towards being hierarch-individualists and egalitarian-communitarians. Hierarch-individualists and egalitarian-communitarians vary in their perceptions of risk across a range of policy issues including the HPV vaccine (Kahan et al. 2010) and nanotechnology (Kahan et al. 2009). With regard to climate change, hierarch-individualists

Table 2: Cultural Cognition Questions

Hierarchy-Egalitarian	Individualist-Communitarian
(H) We have gone too far in pushing equal rights in this country	(I) The government interferes far too much in our everyday lives
(H) It seems like blacks, women, gays and other minorities don't want equal rights; they want special rights just for them	(I) It's not the government's business to try to protect people from hurting themselves
(H) Society as a whole has become way too soft and feminine	(I) The government should stop telling people how to live their lives
(E) Our society would be better off if the distribution of wealth was more equal	(C) Sometimes the government needs to make laws that keep people from hurting themselves
(E) We need to dramatically reduce the inequalities between the rich and the poor, whites and people of color, and men and women	(C) The government should do more to advance society's goals, even if that means limiting the freedom and choices of others
(E) Discrimination against minorities is still a very serious problem	(C) Government should put limits on the choices individuals can make so they don't get in the way of what's good for society

tend to view climate change as posing less of a risk than egalitarian-communitarians (Kahan et al. 2012).

Political debates surrounding climate change often pivot on the acceptance or rejection of the scientific consensus. If those that were skeptical of climate knew that there was a strong scientific consensus, then they would view climate change as risky and support policies to address it. However, Hoffman (2015) highlights three key insights about the nature of value-based cognition and climate change including a) the use of cognitive filters, b) these filters reflect our cultural identity, and c) cultural identity overrides scientific reasoning (3-4). Therefore, specific policy attitudes are often formed from a desire to affirm values rather than from a desire to learn from the best-available information.

The use of value-affirming cognitive filters implies that knowledge is not sufficient to change minds about contentious issues like climate change. In fact, increased sophistication can exacerbate polarization. Kahan et al. (2012) found that polarization on climate change risk tended to increase with increasing science literacy and numeracy. This is likely a result of the two-system model of cognitive processing, where system 2 reasoning is used to justify the initial values-based intuitions of system 1. Individuals that are more sophisticated (e.g., more science

literate) are better able to employ system 2 to justify their attitudes.

Environmental cognition refers to the "way individuals structure their thinking about environmental issues and associated political actions" (Henry and Dietz 2012, 238). It works in a similar way as cultural cognition by drawing on environmental values–values associated with the preferred interactions between humans and nature–to guide an individuals consideration of environmental issues. As noted, individuals tend to strive for consistency over accuracy in their values, beliefs, and attitudes therefore the values described by cultural cognition–hierarch-individualists and egalitarian-communitarians–constrain environmental, as measured by the NEP scale. Hierarch-individualists are likely to view nature as tolerant and robust to human intervention whereas, egalitarian-communitarians are likely to view nature as fragile, ephemeral and needing of protection. Finally, these sets of values are likely to constrain policy attitudes. The next section discusses the mechanisms employed by cultural and environmental cognition, followed by an illustration of value-based cognition and climate change risk perceptions.

Mechanisms of Cultural and Environmental Cognition

When individuals draw on deeply held values to make sense of environmental policy disputes they do so through a series of psychological mechanisms, which they may or may not be aware of. Kahan (2012) notes five important mechanisms through which cultural cognition, as well as environmental cognition, operate including cultural identity-protective cognition, culturally biased assimilation of information, cultural availability, cultural credibility, cultural-identity affirmation.

Cultural identity-protective cognition: Cultural identity results from an individual orientating themselves according to their preferred structure of social relationships, which then creates an identity based in the subsequent cultural biases. Cognition in the service of identity-protection ensures that policy attitudes do not threaten an individuals preferred way-of-life. For example, an individualist's identity is based in the belief that individuals in a society should be free to compete and negotiate with others without external interference. Environmental regulation that limits the ability of an entrepreneur to extract resources or develop technology is seen as a threat to the way-of-life preferred by individualists, therefore those with the individualists

cultural orientation are not likely to support such policies.

Culturally biased assimilation of information: The mechanism of biased assimilation of information works to ensure that individuals process information about political and policy issues is a way that confirms, rather than refutes their values. This means that information that supports prior values-based beliefs is weighted more heavily than information that challenges those beliefs. Biased information processing can lead to polarization on issues as those aligned with a particular cultural orientation acquire information that supports their views and refutes the views of others.

Cultural availability: The availability heuristic posits that individuals are biased in their understanding of probabilities by overestimating the likelihood of events that they can readily bring to mind (Tversky and Kahneman 1973). Cultural availability is the mechanism that guides the selection of salient experiences. For example, egalitarians were more likely to perceive increases in temperatures, droughts, and floods in their local areas than were individualists, even when controlling for actual weather deviations (Goebbert et al. 2012). This is likely because instances of weather events that are perceived to be impacted by climate change are more available to egalitarians than to individualists.

Cultural credibility: Notions of credibility are connected to biased-information processing. When shifting through information individuals are likely to place more trust in information that they receive from sources they find credible. The cultural credibility mechanism ensures that credible sources of information are those that align with an individuals prior beliefs and values. For an egalitarian-communitarian a scientist that argues that climate change is a result of the sun cycle are not liking to be seen as credible. Indeed, perceived expertise can be a function of the stated positions on contentious issues rather than the credentials of purported experts. Using an experiment embedded in a survey, Kahan, Jenkins-Smith, and Braman (2011) varied the positions of experts on three contentious issues–climate change, nuclear waste disposal, and gun control–while keeping the credentials (ivy league education, prestigious academic position) of the experts consistent. Kahan, Jenkins-Smith, and Braman (2011) found that respondents were more likely to rate individuals as experts when the experts stated positions on the issues matched the positions of the respondents cultural type. This finding indicates that the credibility of the

information, and the expertise of the source, are determined, in part, through value-based cognition.

Cultural-identity affirmation: The identity affirmation mechanism posits that individuals develop policy attitudes that affirm their cultural identity and biases. For example, the harmful impacts of climate change affirm the suspicions of unencumbered capitalism held by egalitarian-communitarians. One possible implication of identity affirmation is that climate change policy should be a "clumsy solution" that has the potential to appeal to multiple cultural types (Verweij et al. 2006). A clumsy solution for climate change would involve combinations of government oversight, technological development, market forces, and dispersed realms of authority between federal, state, and local government. Such solutions have the potential to build coalitions of policy actors and receive majority public support. Indeed, Kahan et al. (2015) found that offering geoengineering as a solution to climate change reduced polarization between cultural types. In addition, the deployment of nuclear energy as a low-carbon energy source receives support from individualists (M. D. Jones 2011). Finally, Nowlin and Parkinson (2017) found that addressing climate change with renewable energy, geoengineering, and nuclear energy tended to less polarized across hierarch-individualists and egalitarian-communitarians than cap-and-trade, EPA regulations, international agreements, and a carbon tax.

Climate Change Risk

To demonstrate the nature of values and policy attitudes, this section uses unique survey data for a proof-of-concept illustration. The survey data is drawn from residents in South Carolina's eight coastal counties including Beaufort, Berkeley, Charleston, Colleton, Dorchester, Georgetown, Horry, and Jasper and is used to demonstrate the influence of cultural and environmental cognition on climate change risk perceptions. The survey was administered online and collected in two waves. The first wave was administered from March 25th to April 8th 2015 to a sample of residents in each county obtained from Survey Sampling International. The second wave was given to a sample from EMC Research and was administered from August 18th to August 29th 2015.

Respondents were asked their agreement on the cultural cognition questions from Table 2 on a 1 (strongly disagree) to 7 (strongly agree) scale. The hierarchy-egalitarianism scale has a

Cronbach $\alpha = 0.841$ and the individualism-communitarianism scale has an $\alpha = 0.754$ indicating that the scales posses sufficient reliability. For purposes of analysis, dummies variables were created for each cultural type including hierarchs, egalitarians, individualists, and communitarians.[4] In addition, respondents were asked the New Ecological Paradigm questions from Table 1 on a 1 to 7, strongly disagree to strongly agree scale. The Cronbach α for the NEP scale is 0.67. Next, respondents were asked their perceptions of the risk posed by climate change with a 0 indicating no risk and a 10 indicating extreme risk. The mean for the climate change risk question was 7.574 indicating a high level of perceived risk from climate change. Finally, respondents were asked a variety of demographic questions that are used as control variables in the following models.

Given the nature of value systems illustrated in Figure 1 it is expected that cultural cognition will influence environmental cognition and both will influence perceptions of climate change risk. To examine this assertion a Structural Equation Model was performed and the results are shown in Figure 4.

Figure 4: Cultural and Environmental Cognition and Climate Change Risk

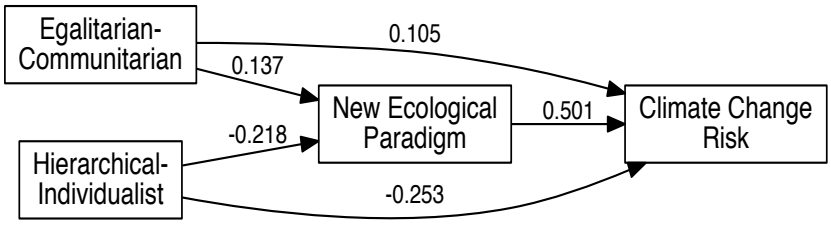


Figure 4 shows the estimated standardized path coefficients.[5] As can be seen, egalitaritan-communtarianism is associated with an increase on the NEP scale as well as an increase in perceived risk from climate change. On the other hand, increasing hierarchy-individualism is associated with a decrease in the NEP scale as well as a decrease in climate change risk perceptions. Finally, an increase in the NEP scale is associated with increased perceptions of

[4]For the hierarchy-egalitarianism scale higher scores indicated an increasing egalitarian orientation, so scores from 1 to 3 on that scale were coded as hierarchs and scores from 5 to 7 were coded as egalitarian. The same process was performed for the individualism-communitarianism scale, with higher values indicating communitarianism. However, given a low number of communitarians in this sample the coding for communitarians was relaxed to include scores of 4 to 7.

[5]The unstandardized coefficients and full model results are shown in the appendix.

climate change risk. Table 3 show the direct, indirect, and total effects associated with cultural and environmental cognition and climate change risk.

Table 3: Effects of Cultural and Environmental Cognition on Climate Change Risk

	Direct	Indirect	Total
Egalitarian-Communitarian	0.105	0.069	0.174
Hierarchical-Individualist	-0.253	-0.109	-0.362
New Ecological Paradigm	0.501		0.501

The direct effect of being an egalitarian-communitarian on climate change risk was an increase of 0.105 on the 10-point scale. The indirect effect (0.137*0.501) was 0.069, for a total effect of 0.174. For hierarchical-individualist the direct effect was -0.253, the indirect effect was -0.109, for a total effect of -0.362. Finally, the direct effect of the NEP scale on climate change risk was 0.501. These results illustrate the hierarchical nature of value systems and the impacts of value-based cognition on attitudes about climate change.

Conclusion

This chapter examined the role that value systems play in shaping environmental policy attitudes and discourse. Value differences are one of the major bases for environmental disputes. Values are hierarchically structured such that broad in scope core values regarding the role of government in society or the preferred structures of social relationships constrain environmental values regarding the relationship between humans and nature and both work to shape attitudes about specific environmental policy issues such as climate change.

Several cognitive mechanisms are employed to translate values into specific attitudes. The two-systems model of cognition posits that on one level, system 1, individuals make quick, intuitive judgments, while more deliberate cognition occurs on another level, system 2. Values inform system 1 intuition and are then reinforced by system 2 reasoning. The method of system 1 and system 2 cognition is aided by a set of mechanisms that seek to protect and affirm value-based identities as well as motivate information processing.

Political ideology and partisanship tend to be the most clearly expressed core values in public and political debates about environmental policy issues. Partisan and ideological divisions regarding environmental issues have grown over time for both elected officials and the public.

Even though many in the public, particularly those that aren't politically engaged, may not clearly align on a single left-right dimension (see Swedlow and Wyckoff 2009), political parties provide the public a "team" with which to align to make sense of complex policy issues. As seen in Figure 2, divides among the public between self-identified Democrats and Republicans exist regarding support for government spending on the environment and this division seems to have grown since the early 1990s. Political parties are coalitions of individuals that hold various core values. Indeed, institutions, such as parties, aide individuals in orientating their values with regard to policy debates (Jackson 2015).

Salient core values extend beyond political ideology and partisanship. Most notably, cultural theory argues that individuals derive their values from their preferred structure of social relationships. Potential social orderings vary on a grid dimension, which reflects the degree of social regulation, and a group dimension that reflects the preferred degree of social cohesion. These dimensions combine to create four ways of life–hierarchy, egalitarianism, individualism, and fatalism–and four associated myths of nature–tolerant, ephemeral, benign, and capricious–that become the foundation for value-based cognition. Combining the value orientations of cultural theory and insights from social psychology, cultural cognition posits that the pivotal culturally derived values are hierarch-individualists and egalitarian-communitarians.

At the domain-specific level of values are environmental values based in questions of the appropriate relationship between humans and nature. While cultural theory provides four myths of nature, environmental values are reflected in one dimension with cornucopians, who view nature as providing abundant resources on one end and environmentalists, who view nature as fragile on the other. Like the four myths of nature, ecological values are constrained by the core values represented by an individuals cultural identity. Core and environmental values constrain attitudes on issues like climate change, through a series of cognitive mechanisms. The chapter finished with an empirical demonstration of the influence of cultural cognition and ecological values on the perceived risk of climate change.

Technical Appendix

Table A1: OLS Analysis of the New Ecological Paradigm and Climate Change Risk

	Dependent variable:	
	NEP Scale	Climate Change Risk
	(1)	(2)
Egalitarian-Communitarian	0.250***	0.615***
	(0.083)	(0.218)
Hierarch-Individualist	−0.372***	−1.393***
	(0.079)	(0.208)
Age	0.0003	0.003
	(0.002)	(0.006)
Education	0.010	−0.027
	(0.026)	(0.069)
Male	−0.199***	−0.027
	(0.072)	(0.187)
White	0.365***	−0.404*
	(0.090)	(0.237)
Income	−0.034	0.062
	(0.021)	(0.055)
NEP Scale		1.614***
		(0.113)
Constant	4.495***	0.502
	(0.151)	(0.642)
Observations	532	532
Adjusted R^2	0.119	0.429
Note:		*p<0.1; **p<0.05; ***p<0.01

Table A1 presents the unstandardized OLS regression coefficients for the full models used for Figure 4 and Table 3.

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