

Oxford Research Encyclopedia of Climate Science

How the Arts and Humanities Help People See, Feel, and Engage with Climate Change

Julia B. Corbett and Brett Clark

Subject: Climate Change Communication Online Publication Date: May 2017

DOI: 10.1093/acrefore/9780190228620.013.392

Summary and Keywords

The communication strategy of simply sharing more scientific information has not effectively engaged and connected people to climate change in ways that facilitate understanding and encourage action. In part, this is because climate change is a so-called wicked problem, given that it is socially complex, has many interdependencies, and lacks simple solutions. For many people, climate change is generally seen as something abstract and distant—something that they know about, but do not “feel.” The arts and humanities can play an important role in disrupting the social and cultural worldviews that filter climate information and separate the public from the reality of climate change. Whether it is the visual arts, dance, theater, literature, comedy, or film, the arts and humanities present engaging stories, corporally sensed and felt experiences, awareness of interdependency with the world, emotional meanings, and connection with place. Climate stories, especially those based on lived experiences, offer distinct ways to engage a variety of senses. They allow the “invisibility” of climate change to be seen, felt, and imagined in the past, present, and future. They connect global issues to conditions close to home and create space to grieve and experience loss. They encourage critical reflection of existing social structures and cultural and moral norms, thus facilitating engagement beyond the individual level. The arts and humanities hold great potential to help spur necessary social and cultural change, but research is needed on their reach and efficacy.

Keywords: Climate change, communication, arts, humanities, storytelling, corporal, emotions, interdependency, sense of place, engagement

Introduction

A difficult yet extremely important issue is how to engage and connect people to climate change effectively, in ways that facilitate understanding and encourage action. Stanford University biologist and MacArthur Genius Paul Ehrlich (2010) concluded that more natural science research will not change the “much talk, little action” status of climate change. Instead, he argues, the social sciences and humanities need to be rebooted in a way that refocuses and provides better understanding of human behaviors.

As part of the reboot effort, this article analyzes how the arts and humanities can help move beyond the “much talk” paradigm of climate change communication. A variety of disciplines—visual arts, literature, theater, dance, film, and place-based and oral engagement—hold promise for deeper public engagement by making climate change real, palpable, and connected to people’s everyday lives.

First, some of the reasons why current research and information efforts have not significantly engaged the public are discussed. Second, consideration is given as to why the unique and wicked problem of climate change requires a decidedly different communication approach. Third, five key elements are discussed that may effectively engage audiences through the arts and humanities—storytelling, corporally sensed and felt experiences, interdependency with the world, engaged emotions, and connection with place—along with examples that embody these features. Finally, the conclusion reflects on research that is needed to evaluate the power and reach of current arts and humanities efforts, as well as possible efficacious humanities paths forward.

Climate Change Communication: More Information Is Not Enough

A great deal of the focus in climate change communication research over the last 30 years has been devoted to measuring individuals’ knowledge of and perceptions about climate change and determining how to craft better and more effective messages and frames based on respondent characteristics. The guiding notion has been that there is an information deficit, and if the public only knew more, then climate change would be addressed. Even some scientific reports (and some scientists) stand by the “more information, more knowledge” solution. In a press release for the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), chair Rajendra Pachauri said, “We have the means to limit climate change ... All we need is the will to change, which we trust will be motivated by knowledge and an understanding of the science of climate change” (IPCC, 2014). Accordingly, large-scale, national, quantitative surveys have tapped our collective understanding and perceptions over time and

How the Arts and Humanities Help People See, Feel, and Engage with Climate Change

determined how specific demographics are tied to various responses. Here is a brief summary of major areas of research and pertinent conclusions.

The Six Americas national survey identified six audience segments for climate change public engagement campaigns: Alarmed, Concerned, Cautious, Disengaged, Doubtful, and Dismissive (Maibach, Leiserowitz, Roser-Renouf, & Mertz, 2011). It was determined that 33% of the adult population in the United States was in the Concerned category, with 18% in Alarmed and 19% in Cautious. These groups viewed climate change as a problem, but sentiments varied on whether it was perceived as a personal threat. For those who were concerned, changing personal consumer behavior was seen as a viable action. Matthew Nisbet (2009) recommended a typology of message frames and interpretive storylines to find common ground for communicators. These frames would communicate what is known to be true about climate change and would appropriately weigh specific considerations of import, rather than creating space for speculation and/or denial. Others have investigated the role of news media in framing, the counterclaims of the conservative movement, and techniques used to create climate doubt among the public (Brossard, Shanahan, & McComas, 2004; McCright & Dunlap, 2000; Oreskes & Conway, 2010). In a meta-analysis across 56 nations of determinants of climate change beliefs, Hornsey, Harris, Bain, and Fielding (2016) found that individuals' objective and subjective knowledge had fairly small effects on sentiments. The strongest correlation between climate change beliefs and demographics was political affiliation and political ideology. Between 2001 and 2010, ideological and partisan polarization on climate change increased, with conservative white males more likely than all other groups to support climate denial, and this group had a significant influence on public understanding (McCright & Dunlap, 2011, 2013; McCright, Dunlap, & Xiao, 2014).

Other studies have noted significant confusion and conflation of climate change with ozone depletion, air pollution, and weather (Dunlap, 1998). Belief in climate change waxes and wanes with heat waves and winter blizzards, as does the perception of scientific consensus. (See the article "Personal Experience, Extreme Weather Events, and Perceptions of Climate Change".) Individuals lack practical knowledge regarding how to reduce emissions effectively. They also face major challenges associated with a sense of futility, the lack of government leadership, ineffective policies, skepticism regarding public and social planning, and the absence of viable conceptions of alternative futures. Lorenzoni, Nicholson-Cole, and Whitmarsh (2007) list additional individual and social barriers to climate change engagement in the United Kingdom, such as distrust of information sources, fatalism, and social norms and expectations.

Further complicating matters, Johanna Wolf and Susanne Moser (2011), in a review of studies around the world, determined that information about climate change is always filtered through preexisting cultural worldviews—such as how nature works and is valued, what is considered good and just in society, and what is the proper role of government and individual action. These worldviews influence the uptake, understanding, interpretation, and response to climate change information (Morton, Rabinovich,

Marshall, & Bretschneider, 2011; Jost, Ledgerwood, & Hardin, 2008). Through meta-analysis, Hornsey and colleagues (2016) found that less belief in climate change was correlated with individualistic and hierarchical cultural values, as well as a strong belief in free-market ideology. In the United Kingdom, Tyndall Centre climate scientists Kevin Anderson and Alice Bows (2012) highlighted how these preexisting worldviews and privileged positions influence presentations and discussions concerning climate change.

Mainstream neoclassical economists emphasize the importance of exponential growth and unregulated markets. This business-as-usual position promises technological fixes as solutions, an approach that is used to displace consideration of larger social change. In order to avoid being depicted as being political, biased, and alarmist for contravening prevailing economic beliefs, many climate scientists “repeatedly and severely underplay implications of their analyses” (Anderson & Bows, 2012, pp. 639–640). Andrew Szasz (2007) contends that the dominant worldview even shapes the responses of individuals who are concerned about climate and other environmental issues. The individualistic culture encourages shopping as a solution, rather than organizing as communities for reform and change.

Overall, research has largely dispelled the “information deficit” model of climate change communication (Nisbet & Scheufele, 2009; Sturgis & Allum, 2004); studies have even found that more knowledge can hinder behavior change (Gardener & Stern, 2002; Kahlor & Rosenthal, 2009). Additionally, typical one-way communication (both individual messages and entire campaigns) do not create deep engagement and have not led to sustained behavioral or political engagement (Moser, 2007; Whitmarsh, O’Neill, & Lorenzoni, 2010). A clear conclusion is that more or supposedly better information and knowledge alone is not powerful enough to engage the public and produce action.

Climate Change Communication Requires Different Approaches

A “wicked problem” is one that lacks simple or straightforward responses, has many interdependencies, and is socially complex, and attempts to address such an issue often lead to unforeseen consequences (Hulme, 2009). A group of scholars (Levin, Cashore, Bernstein, & Auld, 2012) recently labeled climate change as a “super wicked problem” with four key features: (a) time is running out; (b) those who cause the problem also seek a solution; (c) central authority is weak or nonexistent; and (d) irrational discounting pushes responses into the future.

Given this context, it is not surprising that information is not the limiting factor in action on climate change. Greenhouse gases are invisible and unknowable to all human senses. You cannot look around and see climate change itself; it is only by comparison to past decades and centuries—with sufficient knowledge of the natural world and its cycles—

that change is apparent or visible (Corner & Clarke, 2017; Hulme, 2009). Human causes and contributions are dispersed and not visible (or at least not connected): turning on the air conditioner, buying clothes, working in your office, flying from coast to coast, and shopping for groceries. The social structural dimensions seem even more distant: an economic system predicated on constant expansion, an energy grid largely dependent on burning fossil fuels, an extensive trade network, pervasive marketing encouraging ever-more consumption, unique energy demands of the built environment, and the global food system.

The consequences of climate change are disproportionately distributed around the world and have already contributed to forced migrations and eroded traditional economies of First Peoples. Nevertheless, for many in the global North, climate change can feel more like a theoretical threat, existing “out there” on a different spatial and temporal scale, which is far different from typical risks and threats encountered in everyday life (Wolf & Moser, 2011). Philosopher Robert Kirkman (2007) contends that the threat of climate change is something that we know *about*, not something that we *feel*, and thus it seems more theoretical and hard to grasp as a danger. So far, to most people on the planet, climate change is abstract and distant, not concrete and easily felt. The risk feels nonpersonal and concerns the future, other places, other people, and other species (Leiserowitz, Maibach, & Roser-Renouf, 2008). The need for action does not seem compelling or urgent. This notion is reinforced by economists, such as William Nordhaus (2008), who employ discounting (a technique that involves assigning a value to the future relative to the present) to argue that nations should only invest modestly in reducing carbon dioxide emissions in the short term and slowly increase this amount over time. This “wait-and-see” approach displaces the culminating challenges, problems, and expenses onto future generations.

Individuals respond to and process information differently. For some people, knowing the scientific facts about climate change may not feel helpful or beneficial. In fact, knowing about it may make people feel paralyzed by the magnitude and complexity of the problem, and they may disengage because of a negative (and fully rational) appraisal of their individual capacity and efficacy to do something about it (Wolf & Moser, 2011). Thus, knowing about climate change may exist alongside a strong sense of not knowing, as people tune out and become numbed to this backdrop in their everyday lives (Norgaard, 2011). In comparison, it was easy to stop using ozone-depleting gases; it is virtually impossible just to step outside the dominant fossil fuel culture in which we are embedded.

Climate change is very threatening to our *ontological security*, which “refers to the confidence that most human beings have in the continuity of their self-identity and the constancy of the surrounding social and material environments of action” (Giddens, 1991, p. 92). Large-scale environmental change is psychologically disturbing and threatens our sense of who we are, what our dreams are, our social networks, and the natural world on which we depend.

Some researchers have concluded that climate change messages should avoid negative emotions like fear and guilt, as dire messages can have contradictory effects (Feinberg & Willer, 2011; O'Neill & Nicholson-Cole, 2009). At the same time, other researchers have found that such messages and calls for action can increase knowledge and heighten concerns regarding climate change (Brulle, Carmichael, & Jenkins, 2012). Clearly, messages and images, particularly those that are emotion-based, are not processed uniformly by all recipients, especially in terms of salience and self-efficacy.

At the individual and societal levels, disturbing emotions related to climate change may be fully present and strongly felt, even if they are not recognized. In her yearlong ethnography of a small Norwegian town, sociologist Kari Norgaard (2011) concluded that strong emotions and behaviors may seem as though they belong solely to individuals, but they are very much the products of social and cultural levels of communication. The apathy, denial, and lack of engagement that she witnessed stemmed not from individual lack of concern, but from the collective normalization of emotion and behavior. This occurs at the social level: what people talk about, pay attention to, and emote. In what Norgaard calls the *social organization of denial*, ignoring climate change occurs in response to social circumstances and is carried out through a process of social interaction. Individuals collectively (not just individually) distance themselves from climate change information and the emotions that come with it.

Thus, individuals and society at large participate in what Norgaard calls *implicatory denial*; this is not a rejection of climate change facts, but rather a failure to integrate those facts into everyday life or transform them into everyday action. In her study, in an abnormally warm and snowless winter, Norwegians *knew* about climate change at the same time that they lived in a way suggesting that they did not know.

Because climate change is a wicked issue, because social and cultural levels of communication influence emotions and self-efficacy, and because of the way individuals and societies have avoided responding to it, a reboot of communication strategy is seriously needed. The following sections propose that the arts and humanities hold much potential for presenting climate change and its consequences in ways that allow people to see and feel them, forging intimate personal and social connections that inspire action. In this sense, the arts and humanities can play an important role in shifting the social and cultural factors that influence community action and self-efficacy.

Arts and Humanities: Forging and Experiencing Connections

The arts and humanities are extensive realms, which could be endlessly explored. Furthermore, there is much fluidity among the arts, humanities, and sciences. In fact, some of the most exciting work involves areas where these fields of study intersect. A few

How the Arts and Humanities Help People See, Feel, and Engage with Climate Change

of the important ways that the arts and humanities can help move beyond simply conveying information about climate change to seeing and feeling it corporally are discussed here. This move is especially imperative; it helps connect people to place in relation to the larger natural world—bonds that have become increasingly alien to many.

Both academic works and public representations of the arts and humanities are considered. The latter provides useful examples beyond the halls of academia, which often are not adequately studied but nevertheless embody powerful elements for forging connections. This work is generally informed and influenced by climate science and tries to address some of the aforementioned shortcomings in climate change communication. The arts and humanities, in education and in public, offer significantly different ways to engage people. They include telling climate stories in distinctive ways that involve a variety of senses. They allow the so-called invisibility of climate change to be seen, felt, and imagined in the present and the future. The arts and humanities create space to grieve and experience loss. They help establish a sense of place in relation to the larger world. They encourage critical reflection of existing social structures and cultural and moral norms. Here, the importance of engaging beyond the individual level is emphasized as a path to social change. As part of the exploration of these issues, five key elements (along with examples) within the arts and humanities that effectively connect with audiences are discussed: engaged stories, corporally sensed and felt experiences, interdependency with nature, emotions, and connection with place. As can be expected, these key elements overlap and reinforce each other.

Climate Stories and Engagement

Engagement with climate change has been defined as “a personal state of connection with the issue ... concurrently comprising cognitive, affective and behavioral aspects” (Lorenzoni et al., 2007, p. 446). According to Wolf and Moser (2011), engagement takes place on three levels: the mind, the heart, and the hands. It is deeper and more interactive than a one-way delivery of information, and it typically extends beyond purely rational-cognitive information processing. Thus, climate engagement involves understanding and caring about the issue, feeling that something can be done to address the problem, and interacting with others to create avenues to accomplish change.

Within the arts and humanities, climate stories and literature are among the recent attempts to make discussions regarding climate change the social norm. Kathleen Dean Moore and Michael Nelson (2010) initiated a global conversation to collect moral wisdom about climate change from artists, activists, politicians, community leaders, writers, scientists, religious leaders, business leaders, and others, with a specific focus on fusing facts and values. In *Moral Ground: Ethical Action for a Planet in Peril*, over 80 individual authors assert that we have a moral obligation to act in the face of increasingly devastating consequences. Reasons for acting are varied: (a) wanting to ensure that their children and grandchildren can experience the joys and beauty of the world; (b) desiring to protect the conditions that have allowed so many other species to flourish; (c) working to maintain sacred cultural traditions; (d) enabling humans to embrace their interdependency to the larger world; (e) feeling love and appreciation of the Earth; (f) striving to be good stewards of creation; and (g) insisting that justice demands it. Readers end up in dialogue with the authors, sharing specific dreams, hopes, and reasons for caring about the state of the world. Rather than reducing demand for action to a single explanation, these essays offer many reasons that connect with a diverse public.

A variety of storytelling projects and oral histories provide engagement with environmental issues and climate change (Ereaut & Segnit, 2006; Kearney, 1994; Leggett & Finlay, 2001; Milstein, Anguiano, Sandoval, Chen, & Dickinson, 2011). Ashlee Cunsolo Willox and colleagues (2013) worked with the Inuit government in Rigolet, Labrador, Canada to encourage residents to engage in digital storytelling to document how changing climate was affecting local ecosystems, as part of a larger project called “Changing Climate, Changing Health, Changing Stories.” These tales shared how Inuit peoples’ lives are situated within the surrounding landscape and ecosystems. Changing environmental conditions affected hunting, fishing, and traveling and undermined the well-being and health of these communities. Individuals explained how climate changes contributed to feelings of depression, anxiety, and fear, as their lives were made more difficult. This project connects climate change with real people. These stories, in combination with others, counter the tendency to view climate change as merely a theoretical threat.

How the Arts and Humanities Help People See, Feel, and Engage with Climate Change

A relatively new genre of fiction—climate fiction, also known as *cli-fi*—is helping to break the silence surrounding climate change. These books generally take place in the present or near future and convey the scientific information and social context of climate change through the experiences of the characters in the novels, and in the case of Barbara Kingsolver’s *Flight Behavior* (2012), the phrase *climate change* is barely mentioned. Like science fiction, cli-fi is speculative fiction that focuses on an unfolding crisis but allows readers to consider different scenarios, adaptations, and strategies. In her dystopian trilogy, Margaret Atwood (2003, 2009, 2013) examines climate change bound up with social inequality, genetic engineering and technology, and powerful corporations. Kim Stanley Robinson, a popular science-fiction novelist, writes of climate change in his *Science in the Capital* trilogy (2004, 2005, 2007). In *The Collapse of Western Civilization: A View from the Future* (2014), historians of science Naomi Oreskes and Erik Conway depict a world radically transformed by climate change. This fictional account, informed by scientific knowledge regarding the likely environmental consequences of climate change, offers readers a vivid and unsettling depiction of the future that is being created. These few books are important, particularly given the remarkable absence of climate change from the imaginary of fiction in general, as noted by Indian novelist Amitav Ghosh (2016).

Climate stories are also engaging when they are performed, such as in theater, dance, and comedy. A site-specific dance performance at New York’s American Museum of Natural History in 2015, titled *On the Nature of Things*, involved dancers from the Armitage Gone! Dance Company and the Manhattan Youth Ballet, narration from Paul Ehrlich’s essay “On Closing the Culture Gap,” and music from several musicians, including Philip Glass. According to Armitage, the piece was meant to evoke the perils, harmony, and chaos of climate change and other environmental problems in music and body language, and to communicate the need to adapt human nature to nature (Brooks, 2015). Theater productions include *The Great Immensity, If There Is I Haven’t Found It Yet*, and *This Clement World*; productions in Great Britain included *The Word for Snow, The Heretic, Ten Billion*, and *Greenland*. *The Great Immensity* received a “rare and unusually large” \$700,000 arts grant from the National Science Foundation (Zinoman, 2013). *Greenland*, which was performed at the National Theatre in London, presents three stories addressing the personal, political, and scientific. The three stories include those of a young man who documents how climate change is affecting the behaviors of arctic birds; a college student who drops out of school so that she can devote herself to political mobilization; and a climate modeler who fears that the consequences of climate change are going to be worse than he can imagine. The conflictual and ineffectual political strategies to address climate change that were discussed at the United Nations Climate Conference in Copenhagen in 2009 are front and center, generating an unsettling tension regarding what to do (Sierz, 2011).

Documentary films have presented powerful climate stories, highlighting ecological transformations and public efforts to address this global problem. *The Island President* (2012) focuses on the threat that the citizens of the Maldives confront due to rising sea levels by detailing the efforts of Mohamed Nasheed, who was president from 2008 to

How the Arts and Humanities Help People See, Feel, and Engage with Climate Change

2012, to mobilize global support to address climate change. Nasheed explains that failure to address climate change will submerge the 1,200 islands of the Maldives, wiping the nation off the map. To dramatize the issue, the Maldives government held a 30-minute underwater cabinet meeting and signed a document calling on all nations to cut carbon dioxide emissions.

For centuries, comedy and satire have broached difficult topics and revealed their contradictions, expressed emotions, and relieved tension, and increased the salience of certain topics. A variety of individuals have used climate change as a comedy topic, including many stand-up comics (from George Carlin to Jon Stewart and John Oliver), but also scientists at the National Aeronautics and Space Administration (NASA) and the faith-based organization Operation Noah. One study (Feldman, 2013) found that the majority of the satirical “news” content on the *Daily Show* and *Colbert Report* affirmed the existence of climate change; another experimental study (Brewer & McKnight, 2015) determined that this content did indeed influence viewers’ perceptions about the certainty of climate change. For many, Jon Stewart’s performance with ice cubes and a pitcher of water was infinitely more engaging and memorable than any scientific account of the same phenomenon.

Although engagement, as defined earlier, is an individual personal connection that the aforementioned climate stories attempt to facilitate, the most powerful engagement takes place in larger collectives, such as neighborhoods and communities. Collective engagement in climate change has taken place in national parks (Barrett & Mowen, 2014; Schweizer, Davis, & Thompson, 2013), in Transition Town communities (Smith, 2011), through the national Conversation Café organization, as well as in countless other forums. Engaging people collectively can boost individual self-efficacy, support emotional needs, and lead to empowerment, action, and taking responsibility.

Social interaction can touch people more deeply and thus motivate their interest and sustain engagement. Robert Brulle (2010) emphasizes the need for dialogic communication about climate change in the civic sphere to spur democratic engagement and public dialogue and thus effect social change. Public forums in libraries, theaters, classrooms, and parks bring people together to share their stories, questions, uncertainties, fears, and aspirations. Rather than confronting climate change in isolation, individuals are able to invest in each other collectively and determine potential courses of action. We will return to the subject of engagement when we discuss connections to place later in this article.

Corporally Sensed and Felt Experiences

The ancient Greek philosopher Epicurus argued that the senses provide the basis on which people are able to draw conclusions about the happenings of the world. For him, the senses were fundamental to experience and inquiry. He cautioned that it was not always possible to have absolute answers in many situations, but the senses helped

How the Arts and Humanities Help People See, Feel, and Engage with Climate Change

inform reasoning and make connections. His emphasis on corporally sensed relationships is quite useful to consider with regard to the potential of the arts and humanities for climate engagement. Climate change has been depicted as a theoretical threat that people know about, but that does not register as a felt threat or vulnerability (Kirkman, 2007). Joshua Trey Barnett (2016) argues that an invisible and assumed theoretical threat such as climate change requires both technical knowledge and various mediations for people to perceive it as threatening. In many ways, it must be sensed corporally to feel like a real threat in the present time.

To help overcome this disconnect, social theorist and philosopher Brian Massumi (2010) proposes that *signs* can serve as vehicles to make present and felt something that is absent or seemingly absent. The arts and humanities can further public climate engagement by producing signs that evoke a sense of vulnerability to the force of climate change. In other words, the arts and humanities can create depictions of climate transformations that corporally resonate with individuals, allowing people to see, imagine, and feel climate change in their everyday lives, now and in the future.

Visual signs and visualization are very capable of producing such corporeal sensations. A powerful example is the photography exhibit *Postcards from the Future*. Inspired by photographs of a flooded New Orleans following Hurricane Katrina, Robert Graves and Didier Madoc Jones depicted major cities as they would appear after expected environmental changes. Realistic-looking photos of iconic London were modified to serve as signs of future climate change, with much of London underwater, a parade of camels instead of horses on the grounds at Whitehall, and tornados touching down in Trafalgar Square. This controversial exhibit generated much media attention. It confronted viewers with a starkly familiar but dramatically changed reality. Barnett (2016, p. 11) explains that “the Postcards series puts viewers in the anxiety-inducing position of imagining how their own lives would be impacted should these potential futures become real presents.” The images portray major transformations that engage viewers’ imagination and provoke feelings of vulnerability about living in such a world. A total of 16 actual postcards from the exhibit were produced; printed on the back of each one was “Wish you were here?”

Brazilian artist Nele Azevedo prepared a stunning piece of visual art with her *Melting Men* installation. In 2009, following scientific reports that rising average global temperatures were accelerating the melting of Arctic ice and could cause sea levels to rise by over three feet by 2100, she carved 1,000 miniature humans out of ice. The figures “sat” on the steps in Gendarmenmarkt Square in Berlin and started to melt within 30 minutes. Water pooled underneath the ice people and dripped down the steps. The crowd that saw the melting ice figures bore witness to how the present is connected to the future.

Visualization is a powerful technique to make concrete expected climate changes. Environmental planner Stephen Sheppard (2005, p. 637) advocates testing how “realistic landscape visualisations” accelerate social learning because participants are able to see and feel how climate change will likely transform the places that they consider home,

whether a local neighborhood or city center. He contends that this tool should be employed, along with other approaches, to tap into different motivating factors that help make deep connections and spur people to become active (see also O'Neill & Hulme, 2009; Shaw et al., 2009). In similar fashion, the Virtual Human Interaction Lab produced a virtual reality game and documentary, whereby participants experience ocean acidification through fish avatars. In studies associated with this project, researchers found that participants experience heightened learning associated with seeing through the eyes of the avatars. This game helps individuals visualize what ocean acidification entails and make connections between human actions, such as burning fossil fuel, and climate change.

The difficulty for artists, planners, and communicators in helping individuals see and feel climate change corporally is to turn viewers into active participants in the work rather than passive observers (Duxbury, 2010). Here are two examples of artists who encourage corporal engagement for the vibrancy of the natural world and its mutability. Jill Pelto, an artist and earth scientist, creates paintings to bring awareness to changing climate conditions. At first glance, the viewer sees a watercolor painting of Arctic foxes; however, a second glance reveals that the backdrop of jagged ice behind the foxes is actually made up of data points documenting habitat destruction. A painting of a forest partially ablaze shows the accelerating annual acres burned; the top of each tree serves as a data point for the increase, brought on by droughts and increasing temperatures. Ocean clownfish swim trapped below a line of increasing ocean acidity. The paintings are both pleasing and memorable, sobering and powerful.

Danish artist Olafur Eliasson believes that weather is a fundamental encounter with nature that individuals can experience even in the city and truly participate in. In *The Weather Project*, at the Tate Modern museum in London (2003–2004), Eliasson encouraged viewers to reflect on their understanding and perception of the physical world. The exhibit was created literally out of smoke and mirrors. A semicircular bank of sodium yellow streetlights produced a huge, artificial indoor “sun” in the darkness of the hall, where viewers were also engulfed in the sickly, misty gloom (created with sugar smoke) of a hazy atmosphere. It was truly corporeal; viewers lay on the floor for hours on end, drawn to the powerful yet ominous experience.

As any consumer of visuals knows, the tens of thousands of photos, illustrations, graphs, and other images of climate change are not equally powerful in evoking active and corporeal responses. As photographer Gary Braasch (2013) reflects, seeing is not necessarily believing when it comes to climate change. Many symbolic images have become clichés (polar bears, glaciers, smokestacks) and reinforce the idea that climate change is distant from everyday life (O'Neill, 2013). Braasch says that more empowering visuals would show climate change effects close to home and give visual narratives of how familiar people are harmed by climate disasters. For example, Saffron O'Neill and Sonia Graham (2016) employed photoelicitation, whereby research participants in Lakes Entrance, Australia, took photographs of meaningful places where they lived that they thought would be threatened by flooding or sea-level rise. Researchers interviewed the

How the Arts and Humanities Help People See, Feel, and Engage with Climate Change

participants and discussed the photographs, revealing strong emotional connections to place. The citizens described the meaning the place had for them, their families, and community, causing them to reflect upon current climate mitigation policies. Here, the past, present, and future were brought together as they emotionally felt the gravity of climate change.

A powerful way to visualize “change” is to string photos together in a time series. For instance, the “Chasing Ice” project of James Balog utilizes thousands of time-series images of melting and calving glaciers to show dramatic change that no single photograph can capture. His award-winning documentary film, *Chasing Ice*, portrays an entire season of ice melting from glaciers around the world, each in less than a minute of film. The audience bears witness to these world-changing events, which would have seemed slow, separate, and removed if simply read in the newspaper. Climate change becomes a dramatic experience, immediately taking place.

Interdependency with the World

In her short book *A Sense of Wonder*, Rachel Carson suggested that children are often better naturalists than adults. They actively play in the dirt, grass, and water, noticing insects, spiders, and worms. They make observations and seek answers to questions about the world, and with the help of adults, they can gain a deeper appreciation of the natural world and our place within it (Carson, 1965). In *Silent Spring* (1962, p. 8), Carson provided an extensive critique of the culminating threat posed by the widespread use of pesticides, which she called “biocides” because they harmed all life. She proposed that society take “The Other Road” (Carson, 1962, chapter 17)—using organic methods, such as relying on natural enemies of pests—and affirm our interdependency with the world.

Similarly, Barnett (2016) argues that sensing climate change as a threat to human life is predicated on recognizing one’s interdependency with the world, as well as the world’s own mutability. Biologically, humans are utterly interdependent on healthy ecosystems for water, food, shelter, energy, and materials incorporated into every product that we consume and use. But psychologically and socially, the dominant environmental worldview is anthropocentrism, which attaches instrumental value to the nonhuman world that humans believe they dominate and control (Corbett, 2006). This position stands in stark contrast to more ecocentric worldviews, in which interdependency is fully recognized. Unfortunately, the way that we largely experience our lives does not foster a sense of wonder and knowledge of our interdependency with the world.

It is hard to gain a sense of interdependency with all that is beyond human if you are not outside. In one study, roughly 51% of the U.S. public spent no time outside at all in a normal day, not counting the time moving from house to car to work (Klepeis et al., 2001). Another 30% spent less than an hour per day outside (Robinson & Silvers, 2000). Except for people working on the land, some indigenous people, and a small number of so-called nature lovers and outdoor enthusiasts, most Americans are physically disconnected from

the natural world. That lack of connection makes individuals completely dependent on mediated information about nature and climate change. Our modern, urban, and indoor lifestyles mean that a great many people do not directly experience and know nature and are therefore unlikely to recognize transformations in it, including a changing climate.

An empowering example of science and humanities joining together to instill knowledge of interdependency is the work of ecologist and dancer Nalini Nadkarni (2008), who studies forest canopies. She brings artists and scientists together for “Canopy Confluences” in Washington State, where they spend a couple of weeks climbing trees, collecting samples, and learning about distinct and interconnecting ecosystems. The program helps people see and feel the forests and effectively translates these experiences, emotions, and knowledge of interdependency to a broader population. Participants learn about the dynamic lives of trees and the important ecological services that forests provide for all life on Earth. These confluences generate a broad array of artistic expressions. Children from the inner city, who had previously never climbed trees, integrated their experiences and lessons into original hip-hop songs. Others painted murals of forest ecosystems in their cities to bring this awareness into urban landscapes. Inspired by their corporal experiences in tree canopies, a group of dancers and ecological scientists created *Biome*, an energetic performance that illuminated the rich interconnections, bountiful life, and constant activities taking place within forests. A similar joining of science and humanities takes place in the Spring Creek Project in Oregon’s Cascades Mountains, which will be discussed more fully in the last section of this article.

Another interesting arts and science collaboration took place in Boulder, Colorado. The interdisciplinary organization EcoArts paired dozens of artists with climate scientists from the local National Center for Atmospheric Research to produce the art show *Weather Report: Art and Climate Change* (Dederer, 2007).

In a much broader scope, the collaboration of scientists, artists, and “informers” lies at the center of the Cape Farewell projects. Founder and artist David Buckland said that Cape Farewell is “committed to the notion that artists can engage the public in [climate change] through creative insight and vision.” Since 2001, an international mix of artists and scientists has worked together in the Spitzbergen archipelago in the Arctic Ocean and beyond on projects that visualize and comment on climate change, declaring it to be a cultural responsibility. Cape Farewell artists, also known as *creatives*, evolve the abstract data of science into a creative cultural language that communicates on a human scale the urgency of the complex global climate challenge and strives to break through humans’ mental defenses that delay action. Projects have explored arctic science, sustainable island communities, urban regeneration, and clean-tech industries. The goals of Cape Farewell projects—artworks, films, music, books, comedy, and poetry—are widespread and direct public engagement, broad cultural discussions about climate change, and illumination of humanity’s interdependency with the larger biophysical world.

Openly Engaging Emotions

A chapter in *The Psychology of Climate Change Communication*, a booklet produced by Columbia University, warns against overusing emotional appeals. It notes that emotional appeals can raise interest, but they also can backfire and cause negative consequences. A common misconception is that emotions are irrational and distort decision-making, particularly about risks. While it is important to note potential problems and concerns associated with emotions, it is also necessary to recognize that emotions are not monolithic as far as how the public experiences them. Additionally, as noted earlier, self-efficacy and emotions are influenced by social and cultural levels of communication. Thus, a growing number of scholars are weighing in on the positive and vital role that emotions play in our ability to reason and make judgments, evaluate risks, and consider moral and ethical dimensions (Meijnders, Midden, & Wilke, 2001; Roeser, 2009).

In the current discourse, climate change is abstract and remote, which means that people do not visualize the threat and do not feel personally involved with it (Leiserowitz, 2006). The grim statistics alone—if people even accept them—can easily numb and paralyze us. Emotions like fear can be feel paralyzing without a sense of hope, but appeals to fear can also stimulate people to think and to be critical decision-makers (Meijnders et al., 2001; Roser-Renouf & Maibach, 2010).

Sabine Roeser (2012), a professor of ethics and philosophy, makes the compelling argument that rather than being a threat to rational deliberation about climate change, emotions are a necessary source of reflection and insight concerning the moral impact of it. Emotional engagement, she concludes, leads to a higher degree of motivation and urgency than a detached, rational stance on climate change. In support of this argument, she references scholars from a wide range of disciplines. Empirical work by Slovic, Finucane, Peters, and MacGregor (2004) shows that emotions are a major determinant in risk perception; emotion and reason can interact and emotions convey important meaning. Neuroscientist Antonio Damasio (1994) found in a series of famous studies that purely rational beliefs can be misleading, and emotions can correct such beliefs. Philosopher Martha Nussbaum (1992) argues that emotions are frequently more reliable and less deceptively seductive than intellectual calculations. Gerd Gigerenzer (2007), a psychologist, provides evidence that intuitions can be superior to analytical procedures in evaluating risks, and intuitions and emotions are indispensable for the ethical aspects of risk.

Thus, emotions are potentially a powerful realm in which climate change should be engaged. The same techniques do not work for all people, of course, but avoiding emotions would be unwise. Roeser (2012) argues that emotional messages for climate change enable moral reflection and deliberation of feelings such as justice and sympathy; such messages can close the distance through visuals, narratives, and portraits of people affected by climate change.

How the Arts and Humanities Help People See, Feel, and Engage with Climate Change

Another argument for communicating emotions in climate change discourse is that painful emotions are already present and widespread, both in people worried and concerned about and in people directly affected by climate change, especially in the global South. Suppressing and ignoring emotions is injurious to mental and physical health. Grief and loss are experienced by people around the world whose homes and/or loved places are harmed by climate change. Environmental philosopher Glenn Albrecht (2005) coined the term *solastalgia* to refer to distress that is produced by environmental change to one's home environment. At a Psychiatry Congress meeting in Australia in 2006, *psychoterratic illness* was defined as an Earth-related mental illness where people's mental well-being is threatened by severed healthy links between people and their home territories (Albrecht et al., 2007).

Rosemary Randall (2009) concludes that there is a benefit from facing and mourning the losses associated with climate change. She says that two parallel narratives about climate change currently exist. Typical "loss" narratives portray distant and remote events, while "solution" narratives tend to depict generally small and ineffective steps while totally ignoring loss. Norgaard (2011) provides an apt example of this from her research showing that news stories in a small Norwegian town spoke positively of how much artificial snow was produced but did not mention the loss of regular, snowy winters. Randall (2009) asserts that people need to mourn losses associated with climate change, and until they do, no truly significant action will be possible.

Arts and humanities-based engagement with climate change is well positioned to trigger emotions to help grasp vulnerabilities, reflect on moral options, and provide motivation for acting accordingly. Terry Tempest Williams (2013, <https://www.guernicamag.com/ground-truthing/>), nature writer, activist, and author of *Refuge*, explains that being willing to go to the "dark places" where there is much despair has also been where she finds a strong "sense of empathy and empowerment." Williams was once accused of being wed to sorrow, to which she responded: "No, I'm not married to sorrow; I just refuse to look away." Many of the arts and humanities examples and projects already mentioned include direct emotional appeals or overtones in their climate change communication.

Connecting Place

Part of ontological security is the self-identity felt when surrounded by constant and familiar environments. Mike Hulme (2008) proposes that climate change implicates relationships between people and places, and thus attachment to particular places may be an important tool for engaging people with climate change. The term *place attachment* refers to the emotional bonds that individuals and communities have with a physical environment—bonds that arise from familiarity and a sense of belonging (Devine-Wright, 2013; Hay, 1988). Attachment to place exists at different scales—as Yi-Fu Tuan (1977) notes, it can range from the very local to something as large as the entire planet.

How the Arts and Humanities Help People See, Feel, and Engage with Climate Change

In light of this, it would seem that local attachment could engage people with climate change if they witness and understand changes to their local place. At the same time, given changes to the upper atmosphere and resulting effects on global weather and precipitation patterns, feeling a strong bond as a global citizen is also important. Scholars have debated whether emotional bonds to place motivate people to take place-protective actions, and whether those bonds are strongest at the local, regional, national, or global level. English professor Stephen Tatum (2007, p. 7) emphasizes that it is necessary to recognize “how the global is always being localized and the local is always being globalized.”

Some scholars have found strong local place attachments related to climate change. Ashlee Cunsolo Willox and colleagues (2013) learned that residents in the Canadian Inuit village of Rigolet were extremely attached to the land and grieved the changes taking place. In focus groups with shorefront residents in Monterey, California, Moser (2013) found strong local place attachment and engagement. On the other hand, Norgaard (2011) found strong local place attachment in the Norwegian village that she studied, but that bond did not lead to place-protective action and engagement with climate change.

Other studies have relied on experimental designs or surveys that test message design and ask simple questions about one’s place attachment. Patrick Devine-Wright (2013) found place attachment at multiple levels, and in later research with colleagues, he discovered that respondents who were more attached at the global level had a stronger acceptance of anthropogenic climate changes (Devine-Wright, Price, & Leviston, 2015). (With regard to the latter finding, it is important to note that the researchers used a sole measure of place attachment: “To what extent do you feel a weak or strong sense of belonging to ...,” which could limit the conclusions being drawn.) Leila Scannell and Robert Gifford (2013) tested local and global place messages and found that people responded more strongly to local messages than global ones. In this case, the global message about rising sea levels due to melting ice sheets no doubt felt much more distant than if the message had been about the rise of extreme weather events or changes in precipitation patterns, issues to which more individuals could relate. Devine-Wright (2009) proposes the need to rethink NIMBY (Not in My Backyard) attitudes, not as irrational or pejorative actions, but as a potential form of place-protective action in a location in which people feel that they can enact changes in their responses to developments that disrupt emotional attachments and threaten place-related identity processes.

With the exception of Willox and colleagues’ (2013) multiyear, mixed-method study of the Inuit village, much of the current literature on climate change and place attachment neither taps nor measures engagement and connection to loved places at a deep level (see also O’Neill & Sonia Graham, 2016). The arts and humanities have great potential to link everyday places and experiences to climate changes through outdoor, place-based interactive activities. The next sections describe some actions taking place at the neighborhood, community, and regional levels.

The Canopy Confluences that Nadkarni has organized, as discussed previously, extend lessons learned in the treetops to urban neighborhoods. The Spring Creek Project, a program run by the Department of Philosophy at Oregon State University, brings scientists, writers, and humanities scholars together. Through forays in the Andrews Forest in the Cascade Mountains, these individuals learn about interconnections within a forest ecosystem and strive to produce new ways to imagine our interdependencies within the natural world. This project has led to a number of books and essays, which also encourage the public to get out to hike in this old-growth forest. The Little River Band of Ottawa Indians has created an inspiring restoration project that unites the community around local sustainability concerns (Whyte, Brewer, & Johnson, 2016). Tribal members come together to release lake sturgeon back into the Great Lakes watershed, affirming their connections to each other and the larger environment. The burgeoning movement of “citizen science” is sending people outside to locate milkweed plants for monarchs and report bird sightings for ornithology study. The thousands of records that citizen scientists have provided about the phenology of mammals, plants, and birds nationwide has provided vital documentation of how climate change has altered seasonal timing in virtually all ecosystems. The communication employed by some citizen science organizations to their volunteers is a model for engagement with place and climate change.

Wendell Berry (2012) contends that knowing a place is fundamental to knowing oneself. For Berry, knowledge of a place is rooted in corporal senses, emotions, memories, stories, and history. These closely parallel the five key elements discussed here—elements that overlap and reinforce each other and create an integrated foundation for effective climate change communication.

Conclusion

Documentary photographer Carole Gallagher (2013) once asked the question of whether nuclear catastrophe was beyond the reach of art. After all, she remembered how Picasso’s *Guernica* alerted a sleeping world in 1937 to issues of war and peace. But she knew that alerting the public to the danger of radiation was difficult: it was invisible—people could not see it, feel it, or smell it—but it could kill them. Gallagher concluded that nuclear art could indeed make the invisible visible and awaken powerful emotions and moral conscience, inducing people to act.

Although radiation differs enormously from climate change, both are invisible and dangerous threats that require the involvement of the arts and humanities to reach beyond scientific data and reboot the cultural conversation. Climate change communication must move beyond traditional and ineffective talking “at” individuals, and instead try to capture their hearts, minds, and hands. Seeing and feeling climate change

How the Arts and Humanities Help People See, Feel, and Engage with Climate Change

is necessary for grappling with the difficult moral dimensions and enormous task of social change that lies ahead.

This article has highlighted a few of the ways that the arts and humanities can help effectively reach and motivate a diverse population—with messages, stories, and experiences that are corporally sensed, that illuminate interdependency with the world, that openly engage emotions, and that connect people with place. For each of these areas, research and examples from the arts and humanities, including both the academy and the public, were discussed. The arts and humanities can help transform social and cultural communication levels, potentially creating more opportunities for engagement. The diversity of the arts and humanities is capable of reaching a diverse, broad public with distinct interests.

At the same time, there are considerable challenges associated with the promise of the arts and humanities to engage the public meaningfully about climate change issues. Many of the examples discussed here have very limited reach. Millions have seen Jon Stewart’s comedic bits on climate change, but very few will see a play on Broadway, an art installation, or read a novel. And like so many climate change messages, these are more easily brought to the “choir” than the general populace. Another major challenge is that these stories and experiences are so often dwarfed by the constant daily messages that support the status quo of the fossil fuel culture. Additionally, it is possible that many of the examples discussed in this article are memorable, help people visualize and relate, and broaden the climate discussion, but they do not lead to fundamental changes in social values, to community organizing, or to action for social change.

Some good news is that a wide variety of organizations and institutions are well-positioned to offer activities and programs such as those described here. Many universities have field stations or remote sites that are ideal for collaborations between climate scientists and humanities scholars. Libraries, museums, nature centers, parks, youth camps, and arts venues could readily add arts and humanities-related activities and communication about climate change to their existing programming.

Research is sorely needed to enhance the effectiveness of these arts and humanities-related climate change engagement efforts. This discussion has merely skimmed the surface of this topic; more thorough compilations of arts and humanities activities around the world would be helpful. Much research is needed to evaluate both the reach of current arts and humanities projects and their impact on audiences. Beyond emotional engagement and memorability, what are the characteristics of activities that best motivate individuals to action? What audiences are well suited to receive or respond to arts and humanities engagement, and what audiences are most neglected by such outreach efforts? Finally, what support do arts and humanities scholars need to expand their work into the crucial arena of climate change engagement? While much work can be done to enhance research and activity in this realm, it is clear that the arts and

humanities are an important—in fact, an essential—part of successfully engaging the public in climate change.

References

- Albrecht, G. (2005). Solastalgia, a new concept in human health and identity. *Philosophy Activism Nature*, 3, 41–44.
- Albrecht, G., Sartore, G. M., Connor, L., Higginbotham, N., Freeman, S., Kelly, B., et al. (2007). Solastalgia: The distress caused by environmental change. *Australian Psychiatry*, 15(Suppl.), S95–S98.
- Anderson, K., & Bows, A. (2012). A new paradigm for climate change. *Nature Climate Change*, 2(September), 639–640.
- Atwood, M. (2003). *Oryx and Crake*. New York: Nan A. Talese.
- Atwood, M. (2009). *The year of the flood*. New York: Nan A. Talese.
- Atwood, M. (2013). *MaddAddam*. New York: Nan A. Talese.
- Barrett, A., & Mowen, A. J. (2014). Assessing the effectiveness of artistic place-based climate change interpretation. *Journal of Interpretation Research*, 19(2), 7–24.
- Barnett, J. T. (2016). Sensing a future threat: Visualizing climate change. Paper presented at the Western States Communication Association, February. San Diego, CA.
- Berry, W. (2012). It all turns on affection. Jefferson Lecturer. Available at <http://www.neh.gov/about/awards/jefferson-lecture/wendell-e-berry-lecture>.
- Braasch, G. (2013). Climate change: Is seeing believing? *Bulletin of the Atomic Scientists*, 69, 33–41.
- Brewer, P. R., & McKnight, J. (2015). Climate as comedy: The effects of satirical television news on climate change perceptions. *Science Communication*, 37(5), 635–657.
- Brooks, K. (3-5-2015). This dance project is out to prove climate change is an issue we can't ignore. *Huffington Post*. Available at http://www.huffingtonpost.com/2015/03/25/on-the-nature-of-things_n_6939826.html.
- Brossard, D., Shanahan, J., & McComas, K. (2004). Are issue-cycles culturally constructed? A comparison of French and American coverage of global climate change. *Mass Communication & Society*, 7(3), 359–377.
- Brulle, R. J. (2010). From environmental campaigns to advancing the public dialog: Environmental communication for civic engagement. *Environmental Communication*, 4, 82–98.

How the Arts and Humanities Help People See, Feel, and Engage with Climate Change

Brulle, R. J., Carmichael, J., & Jenkins, J. C. (2012). Shifting public opinion on climate change. *Climatic Change*, 114(2), 169–188.

Carson, R. (1962). *Silent spring*. New York: Houghton Mifflin Company.

Carson, R. (1965). *The sense of wonder*. New York: Harper and Row.

Corbett, J. B. (2006). *Communicating nature: How we create and understand environmental messages*. Washington, DC: Island Press.

Corner, A., & Clarke, J. (2017). *Talking climate: From research to practice in public engagement*. Cham, Switzerland: Palgrave Macmillan.

Damasio, A. (1994). *Descartes' error*. New York: Putnam.

Dederer, C. (2007). Looking for inspiration in the melting ice. *New York Times*, September 23. Available at: <http://query.nytimes.com/gst/fullpage.html?res=9B00E5DC1239F930A1575AC0A9619C8B63&pagewanted=all>.

Devine-Wright, P. (2009). Rethinking NIMBYism: The role of place attachment and identity in explaining place-protective action. *Journal of Community & Applied Social Psychology*, 19, 426–441.

Devine-Wright, P. (2013). Think global, act local? The relevance of place attachments and place identities in a climate-changed world. *Global Environmental Change*, 23, 61–69.

Devine-Wright, P., Price, J., & Leviston, Z. (2015). My country or my planet? Exploring the influence of multiple place attachments and ideological beliefs upon climate change attitudes and opinions. *Global Environmental Change*, 30, 68–79.

Dunlap, R. E. (1998). Lay perceptions of global risk: Public views of global warming in cross-national context. *International Sociology*, 13, 473–498.

Duxbury, L. (2010). A change in the climate: New interpretations and perceptions of climate change through artistic interventions and representations. *Weather, Climate, and Society*, 2, 294–299.

Ehrlich, P. (2010). On closing the culture gap. *Seed Magazine*. Available at http://seedmagazine.com/content/print/on_closing_the_culture_gap/.

Ereaut, G., & Segnit, N. (2006). *Warm words: How are we telling the climate change story and can we tell it better?* London: Institute for Public Policy Research (IPPR).

Feinberg, M., & Willer, R. (2011). Apocalypse soon? Dire messages reduce belief in global warming by contradicting just world beliefs. *Psychological Science*, 22(1), 34–38.

How the Arts and Humanities Help People See, Feel, and Engage with Climate Change

Feldman, L. (2013). Cloudy with a chance of heat balls: The portrayal of global warming on the *Daily Show* and the *Colbert Report*. *International Journal of Communication*, 7, 430-451.

Gallagher, C. (2013). Nuclear photography: Making the invisible visible. *Bulletin of the Atomic Scientists*, 69, 42-46.

Gardner, G. T., & Stern, P. C. (2002). *Environmental problems and human behavior*. 2d ed. Boston: Pearson Custom.

Ghosh, A. 2016. *The great derangement: Climate change and the unthinkable*. Chicago: University of Chicago Press.

Giddens, A. (1991). *Modernity and self-identity: Self and society in the late modern age*. Cambridge, U.K.: Polity Press.

Gigerenzer, G. (2007). *Gut feelings: The intelligence of the unconscious*. London: Viking.

Hay, R. (1988). Toward a theory of sense of place. *The Trumpeter*, 5(4), 159-164.

Hornsey, M. J., Harris, E. A., Bain, P. G., & Fielding, K. S. (2016). Meta-analyses of the determinants and outcomes of belief in climate change. *Nature Climate Change*, 6, 622-626.

Hulme, M. (2008). Geographical work at the boundaries of climate change. *Transactions of the Institute of British Geographers NS*, 33, 5-11.

Hulme, M. (2009). *Why we disagree about climate change*. Cambridge, U.K.: Cambridge University Press.

Intergovernmental Panel on Climate Change (IPCC). (2014). Climate change threatens irreversible and dangerous impacts, but options exist to limit its effects. Available at <http://www.un.org/climatechange/blog/2014/11/climate-change-threatens-irreversible-dangerous-impacts-options-exist-limit-effects/>.

Jost, J. T., Ledgerwood, A., & Hardin, C. D. (2008). Shared reality, system justification, and the relational basis of ideological beliefs. *Social and Personality Psychology Compass*, 2(1), 171-186.

Kahlor, L., & Rosenthal, S. (2009). If we seek, do we learn? predicting knowledge of global warming. *Science Communication*, 30, 380-414.

Kearney, A. R. (1994). Understanding global change: A cognitive perspective on communicating through stories. *Climatic Change*, 27, 419-441.

Kingsolver, B. (2012). *Flight behavior*. New York: Harper.

How the Arts and Humanities Help People See, Feel, and Engage with Climate Change

Kirkman, R. (2007). A little knowledge of dangerous things: Human vulnerability in a changing climate. In S. L. Cataldi & W. S. Hamrick (Eds.), *Merleau-Ponty and environmental philosophy: Dwelling on the landscapes of thought* (pp. 19-35). Albany: State University of New York Press.

Klepeis, N. E., Nelson, W. C., Ott, W. R., Robinson, J. P., Tsang, A. M., Switzer, P., et al. (2001). The National Human Activity Pattern Survey (NHAPS): A resource for assessing exposure to environmental pollutants. *Journal of Exposure Analysis and Environmental Epidemiology*, 11(3), 231-252.

Leggett, M., & Finlay, M. (2001). Science, story, and image: A new approach to crossing the communication barrier posed by scientific jargon. *Public Understanding of Science*, 10, 157-171.

Leiserowitz, A. (2006). Climate change risk perception and policy preferences: The role of affect, imagery, and values. *Climatic Change*, 77, 45-72.

Leiserowitz, A., Maibach, E., & Roser-Renouf, C. (2008). Global warming's 'Six Americas': An audience segmentation. New Haven, CT, and Fairfax, VA: Yale University and Center for Climate Change Communication, George Mason University.

Levin, K., Cashore, B., Bernstein, S., & Auld, G. (2012). Overcoming the tragedy of super wicked problems: Constraining our future selves to ameliorate global climate change. *Policy Sciences*, 45(2), 123-152.

Lorenzoni, I., Nicholson-Cole, S., & Whitmarsh, L. (2007). Barriers perceived to engaging with climate change among the UK public and their policy implications. *Global Environmental Change*, 17, 445-459.

Maibach, E. W., Leiserowitz, A., Roser-Renouf, C., & Mertz, C. K. (2011). **Identifying like-minded audiences for global warming public engagement campaigns: An audience segmentation analysis and tool development.** *PLoS ONE*, 6(3), e17571.

Massumi, B. (2010). The future birth of the affective fact: The political ontology of threat. In M. Gregg, & G. J. Seigworth (Eds.), *The affect theory reader*. Durham, NC: Duke University Press.

McCright, A. M., & Dunlap, R. E. (2000). Challenging global warming as a social problem: An analysis of the conservative movement's counter claims. *Social Problems*, 47(4), 499-522.

McCright, A. M., & Dunlap, R. E. (2011). The politicization of climate change and polarization in the American public's views of global warming, 2001-2010. *Sociological Quarterly*, 52, 155-194.

How the Arts and Humanities Help People See, Feel, and Engage with Climate Change

- McCright, A. M., & Dunlap, R. E. (2013). Bringing ideology in: The conservative white male effect on worry about environmental problems in the United States. *Journal of Risk Research*, *16*, 211–226.
- McCright, A. M., Dunlap, R. E., & Xiao, C. (2014). Increasing influence of party identification on perceived scientific agreement and support for government action on climate change in the USA, 2006–2012. *Weather, Climate, and Society*, *6*(2), 194–201.
- Meijnders, A. L., Midden, C. J. H., & Wilke, H. A. M. (2001). Role of negative emotion in communication about CO₂ risks. *Risk Analysis*, *21*(5), 955–966.
- Milstein, T., Anguiano, C., Sandoval, J., Chen, Y., & Dickinson, E. (2011). Communicating a 'new' environmental vernacular: A sense of relations-in-place. *Communication Monographs*, *78*(4), 486–510.
- Moore, K. D., & Nelson, M. (2010). *Moral ground: Ethical action for a planet in peril*. San Antonio, TX: Trinity University Press.
- Morton, T. A., Rabinovich, A., Marshall, D., & Bretschneider, P. (2011). The future that may (or may not) come: How framing changes responses to uncertainty in climate change communications. *Global Environmental Change*, *21*(1), 103–109.
- Moser, S. C. (2007). More bad news: The risk of neglecting emotional responses to climate change information. In S. C. Moser & L. Dilling (Eds.), *Creating a climate for change: Communicating climate change and facilitating social change* (pp. 64–80). Cambridge, U.K.: Cambridge University Press.
- Moser, S. C. (2013). Navigating the political and emotion terrain of adaptation: Community engagement when climate change comes home. In S. C. Moser & M. T. Boykoff (Eds.), *Successful adaptation to climate change: Linking science and policy in a rapidly changing world* (pp. 289–305). London: Routledge.
- Nadkarni, N. (2008). *Between earth and sky*. Berkeley: University of California Press.
- Nisbet, M. C. (2009). Communicating climate change: Why frames matter for public engagement. *Environment: Science and Policy for Sustainable Development*, *51*(2), 12–23.
- Nisbet, M. C., & Scheufele, D. A. (2009). What's next for science communication? Promising directions and lingering distractions. *American Journal of Botany*, *96*(10), 1767–1778.
- Nordhaus, W. (2008). *A question of balance: Weighing the options on global warming policies*. New Haven, CT: Yale University Press.
- Norgaard, K. M. (2011). *Living in denial: Climate change, emotions, and everyday life*. Cambridge, MA: MIT Press.

How the Arts and Humanities Help People See, Feel, and Engage with Climate Change

Nussbaum, M. (1992). *Love's knowledge: Essays on philosophy and literature*. Oxford: Oxford University Press.

O'Neill, S. (2013). Image matters: Climate change imagery in US, UK and Australian newspapers. *Geoforum* 49, 10-19.

O'Neill, S., & Graham, S. 2016. (En)visioning place-based adaptation to sea-level rise. *Geography and Environment*, 3(2), 1-16.

O'Neill, S., & Hulme, M. 2009. An iconic approach for representing climate change. *Global Environmental Change*, 19, 402-410.

O'Neill, S., & Nicholson-Cole, S. (2009). "Fear won't do it": Promoting positive engagement with climate change through visual and iconic representations. *Science Communication*, 30(3), 355-379.

Oreskes, N., & Conway, E. M. (2010). *Merchants of doubt*. New York: Bloomsbury.

Oreskes, N., & Conway, E. M. (2014). *The collapse of Western civilization: A view from the future*. New York: Columbia University Press.

Randall, R. (2009). Loss and climate change: The cost of parallel narratives. *Ecopsychology*, 1(3), 118-128.

Robinson, J. P., & Silvers, A. (2000). Measuring potential exposure to environmental pollutants: Time spent with soil and time spent outdoors. *Journal of Exposure Analysis and Environmental Epidemiology*, 10(4), 341-354.

Robinson, K. S. (2004). *Forty signs of rain*. New York: Bantam Spectra.

Robinson, K. S. (2005). *Fifty degrees below*. New York: Bantam Spectra.

Robinson, K. S. (2007). *Sixty days and counting*. New York: Bantam Spectra.

Roeser, S. (2009). The relation between cognition and affect in moral judgments about risk. In L. Asveld & S. Roeser (Eds.), *The ethics of technological risks*. London: Earthscan.

Roeser, S. (2012). Risk communication, public engagement, and climate change: A role for emotions. *Risk Analysis*, 32(6), 1033-1040.

Roser-Renouf, C., & Maibach, E. (2010). Communicating climate change. In S. H. Priest (Ed.), *The encyclopedia of science and technology communication*. London: SAGE.

Scannell, L., & Gifford, R. (2013). Personally relevant climate change: The role of place attachment and local versus global message framing in engagement. *Environment & Behavior*, 45(1), 60-85.

How the Arts and Humanities Help People See, Feel, and Engage with Climate Change

Schweizer, S., Davis, S., & Thompson, J. L. (2013). Changing the conversation about climate change: A theoretical framework for place-based climate change engagement. *Environmental Communication*, 7(1), 42-62.

Shaw A., Sheppard, S., Burch, S., Flanders, D., Wiek, A., Carmichael, J., Robinson, J., & Cohen, S. (2009). Making local futures tangible—Synthesizing, downscaling, and visualizing climate change scenarios for participatory capacity building. *Global Environmental Change*, 19, 447-463.

Sheppard, S. R. J. (2005). Landscape visualisation and climate change: The potential for influencing perceptions and behaviour. *Environmental Science and Policy*, 8(6), 637-654.

Sierz, A. (2011). *Greenland*. National Theatre. Theartsdesk.com. Available at <http://www.theartsdesk.com/theatre/greenland-national-theatre>.

Slovic, P., Finucane, M. L., Peters, E., & MacGregor, D. G. (2004). Risk as analysis and risk as feelings: Some thoughts about affect, reason, risk, and rationality. *Risk Analysis*, 24, 311-322.

Smith, A. (2011). The Transition Town Network: A review of current evolutions and renaissance. *Social Movement Studies*, 10(1), 99-105.

Sturgis, P., & Allum, N. (2004). Science in society: Re-evaluating the deficit model of public attitudes. *Public Understanding of Science*, 13(1), 55-74.

Szasz, A. (2007). *Shopping our way to safety*. Minneapolis: University of Minnesota Press.

Tatum, S. (2007). Spectrality and the postregional interface. In S. Kollin (Ed.), *Post-Western cultures: Literature, theory, Space* (pp. 3-29). Lincoln: University of Nebraska Press.

Tuan, Y. (1977). *Space and place: The perspective of experience*. Minneapolis: University of Minnesota Press.

Whitmarsh, L., O'Neill, S., & Lorenzoni, I. (Eds.). (2010). *Engaging the public with climate change: Behaviour change and communication*. London: Earthscan.

Whyte, K. P., Brewer, J. P., & Johnson, J. T. (2016). Weaving indigenous science, protocols, and sustainability science. *Sustainability Science*, 11, 25-32.

Williams, T. T. (2013). Ground truthing: Devon Fredericksen interviews Terry Tempest Williams. *Guernica*. Available at <https://www.guernicamag.com/ground-truthing/>.

Willox, A. C., Harper, S. L., Edge, V. L., Landman, K., Houle, K., Ford, J. D., & the Rigolet Inuit Community Government. (2013). The land enriches the soul: On climatic and environmental change, affect, and emotional health and well-being in Rigolet, Nunatsiavut, Canada. *Emotion, Space, & Society*, 6, 14-24.

How the Arts and Humanities Help People See, Feel, and Engage with Climate Change

Wolf, J., & Moser, S. C. (2011). Individual understandings, perceptions, and engagement with climate change: Insights from in-depth studies across the world. *WIREs Interdisciplinary Reviews: Climate Change*, 2(4), 547-569.

Zinoman, J. (2013). Fate of the Earth takes center stage. *New York Times*, February 7. Available at <http://www.nytimes.com/2013/02/10/theater/this-clement-world-a-play-about-climate-change.html>.

Julia B. Corbett

University of Utah

Brett Clark

University of Utah

