CHAPTER 9: A NARRATIVE POLICY FRAMEWORK SOLUTION TO UNDERSTANDING CLIMATE CHANGE FRAMING RESEARCH

Erika Allen Wolters*, School of Public Policy, Oregon State University
Michael D. Jones, Department of Political Science, University of Tennessee
Kathryn Duvall, School of Public Policy, Oregon State University

ABSTRACT

The climate change framing literature is vast. So much so that researchers—whether seasoned framing scholars or those foraying into climate change framing research for the first time—can easily be overwhelmed by the sheer volume of studies, the vast array of concepts deployed, the variation in how these same concepts are operationalized, the nuance of a barely numerable assortment of contexts, and the effects all of the aforementioned have on interpreting findings. Here we offer a synthetic review of said literature, focusing on adaptation and mitigation framing studies and findings. In so doing, we first briefly distill the overall developmental arc of climate change framing research. We then provide a conventionally styled thematic overview of the mitigation and adaptation climate change studies. Among other conclusions, we find that while there has been a proliferation of climate change framing research, the findings and the studies themselves are often quite disparate from one another. Moreover, as the literature speaks to itself intermittently and in an ad hoc fashion, it is not readily apparent how climate change framing studies holistically fit together. As a solution to this problem, we offer the Narrative Policy Framework (NPF) as a narrative heuristic to help climate change researchers and communicators organize and understand the literature. We argue that an NPF integration of this inherently unwieldy literature increases the likelihood of research utilization and improves the ability of climate change communicators to inform people about the risks of climate change.

*Corresponding author: erika.wolters@oregonstate.edu

To cite the chapter: Erika Allen Wolters, Michael D. Jones, and Kathryn Duvall. "A Narrative Policy Framework Solution to Understanding Climate Change Framing Research" Chapter 9 in *Narratives and the Policy Process: Applications of the Narrative Policy Framework*. Edited by Michael D. Jones, Mark K. McBeth, and Elizabeth A. Shanahan. Bozeman, MT: Montana State University Library. 222-242. doi.org/10.15788/npf9

INTRODUCTION

Climate change is arguably the most difficult collective action problem ever faced by the human race (Harris, 2007). The projected effects are vast, stretching across both natural and social systems. Increased average global temperatures are predicted to have serious adverse effects on a variety of fundamental human and non-human needs, like food security, water availability, and livable land areas (IPCC, 2018). The scope of cooperation needed spans those same systems and involves billions of people with diverse and often competing interests. However, one of the problems with addressing climate change has been communicating the threats in a way that both accurately informs and motivates action. Attempting to address these aspects of the climate change problem, a large and growing number of framing studies have emerged over the past several decades. To put it mildly, these studies are incredibly diverse. Given the ambiguous definition of frames, the variation in theoretical approaches, methodologies, standards of rigor, academic literature referenced, and a host of other dimensions, coupled with the large volume of studies, climate change framing research can be very difficult to navigate. In this chapter, we argue that the Narrative Policy Framework (NPF) can provide a valuable narrative heuristic that can help both researchers and practitioners come to terms with this complex literature.

To the above end, we first provide a broad overview of the climate change framing literature with the aim of identifying important synergies, trends, and themes. Our approach is not comprehensive. Rather, and in an effort to avoid unnecessary redundancies, we focus primarily (but not exclusively) on peer-reviewed research post-2009, when Matthew Nisbet's seminal piece "Communicating climate change: Why frames matter for public engagement" called attention to the potential of increasing public engagement with climate change through framing in a relevant and consistent way (2009).[38] Because the literature on climate change framing is so vast, we narrowed the scope by focusing on peer-reviewed articles that explicitly identified the use of frames and focused specifically on climate change mitigation and/or adaptation. In the subsequent section, we offer the NPF as a narrative heuristic to help researchers and communicators engage in an ongoing synthesis of the literature. We close with a discussion of the implications of an improved synthesis offered by the NPF for both framing researchers and communicators. Such a strategy, we argue, facilitates future integration of diverse findings in a way that is intuitively understood, thereby increasing the likelihood of utilization and furthering the goal of effectively informing people about the risks of climate change and engaging the public to garner support for climate change policies.

CLIMATE CHANGE FRAMING HISTORY AND ORIGINS: A BRIEF OVERVIEW OF RECENT SUBSTANTIVE, THEORETICAL, AND METHODOLOGICAL DEVELOPMENTS

Matthew Nisbet (2009) describes the general evolution of framing research as dating back to seminal work conducted by Goffman (1974) in the field of anthropology and to

[38] There are many reviews relevant to the climate change framing literature that offer a different take than the one presented here (see for example, Marquart-Pyatt et al., 2011; Dewulf, 2013; Weaver et al., 2017).

psychologists Kahneman and Tversky's Nobel Prize winning work in the 1970s (1979). From this genesis, framing research expanded to other social science disciplines, with discipline-specific foci, but with a general disposition of understanding how best to describe communications and, most importantly, their effects and on whom. As one might expect, the wide usage of the framing concept across varied contexts, embracing different methodological and academic disciplinary standards, and serving the needs of different research questions, has led to incredible variation in applications of the concept. Despite definition-defying usage, in a most general sense, the concept of frames can be understood as the way people communicate about a specific idea or thing of importance—the communicative casing in which we surround something we deem important enough to speak to. Or in academic parlance, we might describe the concept as the oft-cited definition provided by Chong and Druckman, which defines frames as "the set of dimensions that affect an individual's evaluations" (2007, p. 105). With such an ambiguous theoretical characterization, it should be no surprise that there is no single agreed upon definition of frames. This observation holds for specific framing research applications in the area of climate change as well. Thus, in our review of the climate framing literature, we also expectedly find incredible variation in geographic context, methodology, and theoretical foci.

In our review of the literature, the vast majority of research on climate change framing has been conducted in and on Western-style democracies with the most robust economies. Such studies tend to focus on the United States (e.g., Boykoff, 2007; Boykoff & Boykoff, 2007; Ford & King, 2015; Hart & Nisbet, 2012; Nisbet et al., 2013), United Kingdom (e.g., O'Neill, 2013; Boykoff, 2007), Australia (e.g., Hurlstone et al., 2014; McEvoy et al., 2013), Canada (e.g., Ahchong & Dodds, 2012; Scannell & Gifford, 2013) and Europe (e.g., Bertolloti & Catellani, 2014; Shehata & Hopmann, 2012; Olausson, 2009). Far fewer studies are multinational queries (e.g., Schmidt et al., 2013) or focused on countries outside of developed Western democracies. Rarer as they are, such studies do exist, such as Mir et al.'s study in Tehran, Iran (2016) and Azmi et al.'s study of Malaysia (2015). The tilt toward developed countries, which bear a large burden of responsibility for the current climate predicament, no doubt creates a larger narrative that favors the perspectives of those countries.

One need not spend much time in the climate framing literature to become overwhelmed by the variety of theoretical approaches and the methodologies applied in the service of those theories. For example, our review identified theoretical foci invoking construal level theory (e.g., Scannell & Gifford, 2013; Spence & Pidgeon, 2010), emotion (e.g., O'Neil & Nicholson-Cole, 2009), knowledge deficits (e.g., Kellstedt et al., 2008), interpersonal attachment (e.g., Scannell & Gifford, 2013), motivated reasoning (e.g., Hart & Nisbet, 2012), moral foundation (e.g., Severson & Coleman 2015), principal-agent (e.g., Howell et al., 2016), psychological distance (e.g., Singh et al., 2017), reflexive modernization (e.g., McCright et al., 2016), resilience (e.g., McEvoy et al., 2013; Wong-Parodi, 2015), risk (e.g., Carrico et al., 2015), and social dominance (e.g., Devine-Wright et al., 2015), among many others. Across the theories, we also find substantial methodological diversity, including content analysis (e.g., Boykoff, 2007; Boykoff & Boykoff 2007; O'Neill, 2013), interviewing techniques (Bosomworth, 2015; Ung et al., 2015), survey approaches (e.g., Bosomworth, 2015; Howell et al., 2016; Mir et al., 2016; Semenza et al., 2011; Singh et al., 2017; Ung et al., 2015) various experimental approaches (e.g., Evans et al., 2014; Howell et al., 2016), constant comparative analysis and grounded theory (e.g., Sapiains

et al., 2016); and, of course, these methods also expectedly vary substantially in terms of how they are applied.

Adding yet more dimensions to an already complex collection of theory and methods, we also find an impressive number of framing types that are , including but not limited to attribution, or identifying factors responsible for climate change (e.g., Hardisty, et al., 2010; Hart, 2011; Jang, 2013; Parag et al., 2011); belief systems and ideology such as worldviews and political ideology (e.g., Benjamin, et al., 2017; Feinberg & Miller, 2011; Hart & Nisbet, 2012; Levine & Klein, 2017; Myers et al., 2012); distance, or perceived proximity to climate change impacts (e.g., Devine-Wright et al., 2015; Scannel & Gifford, 203; Spence & Pigeon, 2010; Wiest et al., 2015); efficacy, a belief that individual or collective actions can have a positive impact on mitigating climate change (Ung et al., 2015, Bertolotti & Catellani, 2014; Bilandzic & Soentgen 2017; Gifford & Corneau, 2011; Hurlstone et al., 2014; Morton et al., 2011; Wiest et al. 2015); prospect, particularly examining loss versus gain in taking action on climate change, (e.g., Mir et al., 2016), thematic and episodic, that vary in breadth and depth of a frame (Hart, 2011); and wording frames, for example, using the term climate change versus global warming (Benjamin et al., 2017). Oftentimes researchers are also examining more than one type of frame (e.g., McCright et al., 2016; Myers et al., 2012), and theoretical approaches frequently occur in conjunction with one another. It is also important to note that the line between a framing theory and a framing type can be quite difficult to discern. Consequently, when you intersect the possible theoretical, methodological, and framing type dimensions, it produces a daunting multidimensional picture that is more than a little resistant to efforts of categorization.

Our observations about the climate change framing literature mirror more general observations made by scholars about the framing literature (e.g., Kinder, 2007; Cacciatore et al., 2016), which is to say that it is both vast and unwieldy. To illustrate the usefulness of the NPF in potentially taming this literature, our approach here is to first focus on the two dominant substantive characterizations of the problems climate change possess: mitigation and adaptation. To guide our review of the mitigation and adaptation climate framing literature, we rely on categorizing language common to climate change framing research, which includes discussing findings and studies in terms of how they relate to characteristics internal to individuals, factors external to individuals, (e.g., Maibach et al., 2008; Marquart-Pyatt et al., 2011), and the structuring of frames themselves.

Climate Change Adaptation and Mitigation Framing Studies

Mitigation and adaptation are often understood as separate climate change issues, with mitigation focusing on stemming the causes of climate change and adaptation focusing on responding to climate change outcomes (e.g., Dewulf, 2013). Our review of the recent literature suggests far fewer adaptation than mitigation studies. However, Dewulf suggests that "these problem framings and action strategies can be seen as complementary" (2013, p. 324), thus our discussion proceeds by speaking to these two bodies of findings in tandem. One way to begin to grapple with this literature is to start with the various ways that researchers operationalize framed communication structures under investigation. Here we discuss five common framing structure themes seen in the adaptation and mitigation framing literature: issue, attribution, gains and

losses, thematic and episodic, and competitive. We emphasize that these categories are by no means mutually exclusive given the diversity of theory and methods applied in the literature.

Adaptation and Mitigation Framing Structures

Issue frames. Climate change framing research frequently focuses on how people respond to different frames. Among the mitigation and adaptation studies, there are many frame types associated with one or more policy-related dimensions. We refer to this loose collection of dimension operationalizations as issue framing structures. Here we highlight a few of the more notable issue frames. In climate change adaptation research, one of the most consistently effective framing types in engaging people in climate change support is the public health frame (Maibach et al., 2010; Petrovic et al., 2014; Semenza et al., 2011). For example, Myers et al. (2012) found that regardless of an individual's belief in climate change, participants responded positively to public health framing of climate change. This support often manifests in traditionally oppositional populations as well. For example, Maibach et al. (2012) found that even those who were hostile or skeptical to climate change were more likely to be supportive of government policies that aimed to mitigate the public health consequences of climate change. A fairly recent study by Petrovic et al. (2014) found that conservatives were more supportive of policies when air pollution was framed as a public health issue. While most studies find a strong association between the public health frame and climate change policy support, we identified at least one study that did not (McCright et al., 2016). Overall, current findings are in line with earlier scholarship showing the public health frame to be very effective, independent of other factors (Maibach et al, 2010).

Other studies focus on policy areas such as national security, the environment, or the economy. We do see some patterns here. For example, attempts at framing climate change as a national security issue have not been as successful as the public health frame, particularly among those who are more skeptical or deny climate change (Myers et al., 2012). Research has shown that instead of having no effect, the national security frame can further alienate those who are more conservative or Republican-leaning and reinforce skepticism and inaction (Hart & Nisbet, 2012). Related to the environmental framing structure, one adaptation study by Myers et al. (2012) examined how environmental frames affected emotional responses (e.g., hope or anger) to climate change. The researchers found that those who are already skeptical of climate change remained neutral in their emotional responses. Regarding economic frames, several studies examining climate change mitigation have found increased support for climate policies (McCright et al., 2016; Parag et al., 2011; Severson & Coleman, 2015) as well as increased support among Republicans and Independents to voluntarily pay for mitigation when it is framed as an offset rather than a tax (Hardisty et al., 2010).

Resilience frames are an interesting and popular focus in the framing literature. Usually understood as an alternative to adaptation, the concept of resilience is more than just adapting to one's environment. Rather, as Holling (1973) defines the concept, it is "a measure of persistence and the ability to absorb change and disturbance" (p.14). For example, Wong-Parodi et al. (2015) compared resilience and adaptation frames in terms of their impact on concern and behavioral intentions. Study participants were asked to write an imaginative essay responding to the frames. The researchers found that the resilience frame elicited more caution and less self-efficacy in

preparatory actions, whereas the adaptation frame lowered levels of concern but encouraged more self-preparedness and responsibility for action. In a primarily descriptive study, McEvoy et al. (2013) examine the Australian government's public campaign attempting to get Australians to rethink their national identity by focusing on their potential resilience toward climate change and encouraging people via their national identity to proactively work on climate change adaptation strategies.

Adaptation and mitigation can also be treated as issue frames (e.g., Carrico, et al., 2015; Howell et al., 2016). For example, Howell et al. (2016) exposed different respondent groups to either mitigation or adaptation frames. For participants with pre-existing high concern for climate change, mitigation was more engaging, whereas participants with low pre-existing concern found adaptation more engaging. Additionally, those participants with low pre-existing concern were disengaged in the mitigation policy frame.

Attribution Frames. Attribution theory "assumes a sequence in which cognitions of increasing complexity enter into the emotional process to further refine and differentiate experience" (Weiner 1985, p. 560). Attribution theory applies to a diverse set of studies leveraging disparate concepts that attempt to explain how individuals understand events in terms of how they attribute emotions (e.g., Hart, 2011), causes (e.g., Jang, 2013), and responsibility (e.g., Hart, 2011). For example, in Jang's 2013 study using causal responsibility framing, Jang found that US study participants were more likely to attribute climate change to natural causes if they read an article that said the United States was the biggest contributor to climate change. However, if participants read that China was the largest contributor to climate change, they were more likely to say that climate change is anthropogenic. Similarly, Hart's (2011) research finds that frames attributing societal responsibility are more effective at generating support for climate change mitigation than are personal responsibility frames. Essentially, people are more supportive of climate change mitigation if the blame for the problem is attributed to "others," e.g., either another country or society at large versus assuming personal (both individually and/or their country of citizenship) responsibility.

Prospect (Equivalency) Frames. One of the more generalizable framing structures (de Vreese et al., 2001), prospect theory contends that an outcome can be exactly the same, but if framed as potential gains or potential losses, individuals will prefer the gains option (i.e., Kahneman & Tversky, 1979). We identified several such studies on climate change mitigation frames (e.g., Bertolotti & Catellani, 2014; Hurlstone et al., 2014). For example, a recent study by Mir et al. (2016) found that gain framing was an effective way to increase participants' willingness to take mitigating climate change action. However, other studies have found that the use of loss vs. gain framing does little to encourage support for climate change mitigation, and in some cases has the opposite effect and can result in decreased overall support (e.g., Wiest et al., 2015; Spence & Pidgeon, 2010). Relatedly and regarding climate change adaptation, Morton et al. (2011) found that the use of positive framing (a frame that discussed avoiding loss) correlated with higher intentions of changing behavior, whereas a negative frame (focused on losses due to climate change) resulted in less commitment to behavior change. Lastly, a mitigation study by Bilandzic et al. (2017) determined that a gain-negative frame (performing mitigation to avoid climate change impacts), in addition to appealing to a sense of guilt, was effective in stimulating willingness to change behavior, while playing on fear was less effective.

Thematic and Episodic Frames. One of the more theoretically generalizable framing structures (de Vreese et al., 2001), the now classic thematic and episodic approach (Iyengar, 1994) to frames was referenced regularly (e.g., Boykoff & Boykoff, 2007; McCright, et al., 2016). This approach delineates a difference between episodic frames that focus on individuals, singular events, over short periods and emphasizes individual behavior from thematic frames that take a broad view of an issue, focusing on longer periods, and which tend to draw attention to structural explanations of a problem. For example, Hart (2011) makes polar bears the symbolic focus of climate change within experimental mitigation framing treatments. Hart finds that thematic framing (focusing on the polar bear population) leads to increased support for mitigation, while episodic (focusing on one polar bear) framing had little to no effect.

Competing Frames. Much of the climate change framing literature is experimental and tends to focus on the effects of a single type of frame. However, like all issues transported outside the lab and into the real world, climate change is more likely experienced by people as multiple competing frames, as people in the real world are regularly exposed to conceptually different ways of seeing the same problem. Addressing this issue, Nisbet et al. (2013) offered one of the earliest studies examining the effects of competitive framing on climate change mitigation. Exploring how competitive (multiple opposing message frames) vs. non-competitive (single frame) influences support for climate mitigation policies, Nisbet et al. (2013) found that when controlling for open-mindedness, ideology, and climate change belief, competitive and non-competitive framing show no significant impact on participant attitudes. Along the same lines, McCright et al. (2016) experimentally employ several different issue frames (economic, national security, public health, and Christian stewardship) all coupled with an active climate denier frame (which had a stronger appeal to conservatives). They found the issue frames did little, while the denial frames powerfully reduce multiple dimensions of climate change supporting dispositions and preferences.

Our conventional categorization scheme identifies several general trends within this literature, including increased support for climate change policies if framed as a public health issue, in economic terms, if the blame (attribution) can be assigned to others, if focused on gains (either positive or avoidance of negative), and by sticking to broader thematic frames.

Adaptation and Mitigation Internal Factors

Another way to categorize climate change mitigation and adaptation framing research is in terms of the characteristics internal to individuals as drivers of important climate change outcome dependent variables, such as perceptions of risk, willingness to act, belief in climate change, support for mitigation or adaptation policies, and the like, and how these drivers affect reactions to the various types of frames deployed in climate change framing research. Common among such queries that incorporate internal characteristics are the usual suspect demographic characteristics such as age, income, education, knowledge, and gender. It is important to note that while these variables may not always be the focus of a study (i.e., control variables), they are often pseudo-obligatory variables in models and research designs and frequently addressed (albeit, piecemeal) in discussions of findings. Consequently, we view them as important in coming to terms with this literature and—more importantly—to grappling with the overall effectiveness of climate change frames.

Age and income are frequently found as elements of climate change framing research designs. For example, the effects of age on climate change beliefs (a common dependent variable examined in climate change framing studies) trend in a general direction but do show some nuance. In general, younger people are more accepting of climate change as a fact (e.g., Lockwood, 2011) and are also more likely than older people to believe in climate science (e.g., McCright et al., 2016). However, beyond these generalities, age-relevant climate framing findings can become quite nuanced. For example, O'Neill and Hulme (2009) observe that local images of threatened areas are likely more salient with older individuals than younger, yet other research suggests it is not clear what motivates older individuals to change their climate-related behaviors (Gifford & Comeau, 2011; Parag et al., 2011). Research that includes income has produced quite mixed results. Higher income has been associated with higher climate change knowledge (Gifford & Comeau, 2011) as well as less willingness to embrace carbon tax and carbon allowance policies that would mitigate climate change (Parag et al., 2011). However, several studies found that income was not a significant indicator of support for climate change policies (e.g., McCright et al., 2016; Nisbet et al., 2013).

Gender can also be characterized as an important internal characteristic. For example, across different framing types, important dependent variables such as belief in climate change and willingness to change behavior in order to mitigate climate was gendered, with many studies citing that women are more supportive of climate change policies than men (e.g., Gifford & Comeau, 2011; Semenza et al., 2011; Scannell & Gifford, 2013; Lockwood, 2011). Specifically, in their study using multiple frames, McCright et al. (2016) found that women were more likely than men to believe that policies seeking to reduce carbon emissions in the United States would have a positive impact on the economy, national security, and public health.

Education in general and climate change knowledge in particular are also identified as important variables in understanding framing effects, although with inconsistent outcomes. For example, in Ung et al.'s (2015) study on climate change adaptation in Cambodia, participants who had more education were more likely to have taken part in anticipatory adaptation activities than those with less education. Likewise, in some studies, higher levels of education are found to be correlated with a greater likelihood of belief that climate change is real (e.g., Schuldt et al., 2011). On the other hand, many studies that control for education found no significant impact on climate change beliefs (e.g., McCright et al., 2016; Baumer et al., 2017; Semenza et al., 2011; Scannell & Gifford, 2011; Nisbet et al., 2013). Specifically related to climate change knowledge, Gifford and Comeau (2011) found that higher income was associated with more accurate knowledge about climate change, although other studies have found no correlation between climate change knowledge and support for climate change policies (e.g., Hart & Nisbet, 2012).

Other factors internal to individuals which are found to influence engagement with climate change frames are perceived efficacy, climate denial, and emotional frames. For example, perceived efficacy has been found to be positively associated with increased engagement with climate change adaptation and mitigation policies as well as behaviors (Ung et al., 2015; Dickinson et al., 2013; Benjamin et al., 2017). On the other hand, people with an internalized sense of climate change denial have been studied with mixed results. McCright et al. (2016) found that where other frames have no effect, denial frames reinforce existing climate denial sentiments in individuals, whereas other studies have found that pre-existing climate

denial can be mitigated with frames that focus on positive externalities, like public health or the economy (Bain et al., 2012; Maibach et al., 2010).

Researchers have also examined how the use of emotional framing, such as appealing to an individual's fear, compassion, etc., is related to support for or opposition to climate change mitigation and/or adaptation. With few exceptions, what the research on emotional framing shows is that negative emotions elicited from framing, such as fear and hopelessness, can be disengaging and disempowering (O'Neill & Nicholson-Cole, 2009; Feinberg & Willer, 2011). Positive emotional appeals are found to be more effective. For example, optimism (Bilandzic, 2017), compassion (Lu & Schult 2016), and positive frames (Hurlstone et al. 2014) are found to be strong motivators for mitigation action and policy support. However, there are outlier exceptions to the above generalizations. For example, Dickinson et al. (2013) found that the use of fear-based framing was effective in increasing willingness to engage in pro-environmental behavior, and Bilandzic et al. (2017) identified guilt as a strong motivator for mitigation support, which is not an emotion straightforwardly categorized as either positive or negative. A general concern identified in the literature over emotional framing is that emotional responses are very likely short-lived (O'Neill & Hulme, 2009) and compassion fatigue can be a problem (Moser & Dilling, 2007, pp. 164–165).

Several studies explore the role of partisanship and/or political ideology in driving support for climate change mitigation and adaptation. These studies tend to find consistent mitigation support among Democrats/liberals regardless of the framing structure (e.g., Benjamin et al., 2017; Hart & Nisbet, 2012). For example, Hardisty et al. (2010) used an online survey and asked participants to state their willingness to pay a higher price for an item that was believed to contribute to climate change labeled as either part of an "offset" or a carbon "tax." They found that Democrats were likely to pay for the item regardless of how it was labeled, whereas Republicans were more likely to pay only if labeled an "offset." Similarly, Levine and Kline's (2017) study focuses specifically on an already left-leaning set of participants. They exposed respondents to public health or national security frames, finding that participants were likely to shift their views even more toward pro-environment. On the other hand, conservatives and Republicans tend to be less supportive of climate change mitigation and adaptation. For example, in a study that explored a national security frame favorable to mitigation policies (Myers et al., 2012), people who were skeptical of climate change and more conservative responded negatively to this frame, which is now popularly referred to as a "boomerang effect" (Hart & Nisbet, 2012), where the reaction to a frame is the exact opposite of the frame's intention. In terms of those in the middle of the political spectrum, moderates have been found to be more supportive of adaptation frames than mitigation (Carrico et al., 2015). However, often when researchers account for other framing dimensions, the relationship between ideology/partisanship and climate mitigation and adaptation is less straightforward. For example, Severson and Coleman (2015) examined how political leanings affected responses to moral, scientific, and economic mitigation frames. They found that a hopeful scientific frame with a focus on economic parity aligned both liberals and conservatives on climate mitigation policy support.

Overall, the review of internal factors and frames provides some insight into climate change framing. Consistently, women, people who had more self-efficacy, and Democrats/liberals were more likely to respond to climate change frames in ways that make

them more willing to change their behavior to mitigate and adapt to climate change. Use of emotional framing, such as activating an individual's sense of optimism, was most impactful with positive framing strategies and elicited more engagement in climate change adaptation or mitigation policies. However, both age and education were inconsistent in framing outcomes.

Adaptation and Mitigation External Factors

While the factors summarized above represent common characteristics internal to individuals commonly referenced in mitigation and adaptation framing research, there are also several themes identified in our conventional review of the literature that are best understood as external to individuals, or constituent factors of their environments. Here we discuss some of the more prominent and interesting external factors, including spatial or distance frames, specific geographies, and weather and climate.

Spatial or distance frames where researchers assess the spatial locus of climate change or individual proximity to climate change events are also common frames invoked within climate change mitigation and adaptation studies. In a study by Singh et al. (2017), researchers found that participants were more likely to be supportive of climate change adaptation policies if they perceived climate change as having an effect closer to home, while also finding that a temporal frame does not affect adaptation support. A local framing of climate change was further found to be effective in gaining support for climate change mitigation in research conducted by Scannell and Gifford (2013), Spence and Pidgeon (2010), and Wiest et al. (2015). However, this local frame has not always been consistent. A study by Altinay (2017) found that local framing had no effect on attaining information about climate change or supporting mitigation efforts. Instead, Altinay (2017) found that place attachment was related to people seeking information about climate change and supporting mitigation actions.

Other mitigation and adaptation studies focus on specific geographies to operationalize frame type. For example, in the adaptation literature, Evans et al. (2014) engaged survey participants from two different towns in New Zealand, both predicted to be affected by rising sea levels in the next few decades. The research found that the group which was first primed with rising sea levels and adaptation was more likely to change their behavior to mitigate climate change. This research seems to suggest that between adaptation and mitigation, mitigation can be seen as the "lesser of two evils" when it comes to climate change.

Relatedly, other research has examined the role of weather and climate on climate change risk perceptions that can impact support for mitigation and adaptation policies. A study by Akerlof et al. (2013) found that survey respondents who reported experiencing effects of climate change also showed increased perceptions of risk that "cannot be fully explained by their demographics, political party affiliation, or surrogate measures for cultural worldviews" (p. 90). Alternatively, Howe and Leiserowitz (2013) found that perceptions of local climate change impact (primarily via perceptions of weather) "is dependent not only on external climate conditions, but also on individual beliefs {and}...prior beliefs about global warming" (p. 1488). Interestingly, those who are more "dismissive" or "doubtful" of climate change were more likely to "bias recollections of seasonal climate through motivated reasoning" (Howe & Leiserowitz 2013, p. 1498).

A conventionally styled examination into external factors that influence an individual's reaction to climate change frames finds, most consistently, framing that focuses on mitigation is preferred over adaptation as this suggests avoiding the need for adaptation in the future. Less consistent were the proximity and direct experience frames. Proximity framing may be more effective in situations where people have a strong sense of place attachment, as opposed to just feeling the area they live in may be impacted, whereas direct experience frames were tempered by climate change beliefs. People who did not hold strong climate change beliefs are less likely to identify weather patterns or recall weather events that can be attributed to climate change.

THE NPF AS A CLIMATE CHANGE NARRATIVE HEURISTIC FOR ORGANIZING THE FRAMING LITERATURE

Above we have offered a good faith effort to categorize the themes and findings we identified in climate change adaptation and mitigation framing research. Our approach is best characterized as conventional, in so much that it relies on common conceptualizations and demarcations within the climate change framing literature (e.g. Marquart-Pyatt et al., 2011; Dewulf, 2013; Weaver et al., 2017). As might now be apparent to the reader, this approach suffers from several limitations. First, coverage of the themes can hardly be considered exhaustive as there are obvious themes present in the literature that we chose to not focus on or simply missed (for example, we do not cover construal level theory, e.g., Scannell & Gifford, 2013). Second, this categorization scheme is not mutually exclusive as research and findings classified in one grouping can often be simultaneously categorized in others. For example, Devine-Wright et al. (2015) examine people's global mindset, where a mindset might be understood as an internal characteristic of individuals, but the global aspect might also be understood as a spatial characteristic external to them. We see similar issues elsewhere, such as when framing studies examine the concept of local (Spence & Pidgeon, 2010; Wiest et al., 2015). However, the important problem generated by potential cross categorizations here is not so much that this study or that study (or elements within) can be concurrently categorized in multiple conceptual boxes; rather, this potential confusion of categorization conflates the actual understandings of the relationships among concepts and findings (i.e., what does it mean for a concept to both an internal and external characteristic?). Such characterizations may generate what is seemingly an arbitrary picture of how studies and findings fit together. This, we believe, exasperates an already difficult problem of grappling with an unwieldy body of research. In short, researchers and communicators need a way of holistically understanding climate change framing research that both allows the systematic integration of findings over time, but that is also still able to leverage existing syntheses of this literature.

Critiquing the sheer volume of framing research and the consequent variation in how the concept of framing is applied therein, the venerable public opinion scholar Donald Kinder offered some "curmudgeonly advice" in 2007 to framing scholars, arguing that they should turn to the idea of narrative (a way to tell a story with a theme, setting, characters, and plot) to help overcome deficiencies in framing research. In our review, we find these same general issues Kinder identified within climate change framing scholarship as well. And while some within framing scholarship have moved in the direction of Kinder's advice, such as Nisbet who defines

frames as an "interpretive storyline" (2009, p.15), or those that operationalize narrative as a specific kind of frame (e.g., Berinksy & Kinder, 2006; Jones & Song, 2014), we argue that there is still room and need for framing research to integrate the concept of narrative. In this section of the chapter, we systemize Kinder's advice to apply to climate change framing research, as it relates to mitigation and adaptation studies.

In some form or another, each climate change framing study depicts a narrative—a narrative about people interacting with a past, present, or future world where they have played or will play a role, and that world is characterized by assertions (and queries) of cause and effect as well as other various factors the researcher deems important enough to include in the narrative. As our previous review of the literature indicates, these individual narratives can be quite different, but we argue that by organizing climate framing findings and models in terms of their specific narrative facets, climate researchers and communicators can start to develop understandings of larger climate narratives—and their relation to each other—by situating their own research within, as well as that of others.

Following along the lines of Jones and Peterson (2017), who engage in a similar activity, we leverage the NPF to assist us in this task. Readers of other chapters of this volume will already know that the NPF allows the scientific investigation of the role of narrative in public policy (Shanahan et al., 2018). Here we do not use it as such. Rather, we show an alternative use of the NPF's categories as a way of providing a narrative heuristic that can help organize climate change framing literature.

The NPF defines narrative as consisting of four distinct elements, which include settings, characters, plots, and morals (i.e., solution to the problem). For our purposes, we are also going to add the category of *framing structure*, which does not neatly fit within the NPF's narrative categories, although attempts have been made to do so (Crow and Lawlor, 2016; Shanahan et al., 2018).

For the NPF, the setting of a narrative is the context. Perhaps the best way to understand it is that the setting is similar to a play's stage, where relevant characteristics of the environment are available for character interaction. In the case of climate change, this can include geography, institutional configurations, facts (both contested and uncontested), a period in time, space, among other potential setting pieces. Regarding climate change frames, an element of the setting might be a specific country (e.g., McEvoy et al., 2013) or a localized setting (Spence & Pidgeon, 2010). The key point is that objects in the setting are external to the characters; thus, any of the findings or elements of a frame identified as external to individuals are positioned well to fit in the setting. Importantly, as with any narrative, not every possible object is included.

Characters are the agents within the narrative. Narratives about climate change tend to include victims that are harmed, villains either overtly or inadvertently responsible for the harm, and heroes that promise to protect victims. Importantly, characters need not be actual people. They can be anthropomorphized elements of the setting such as the environment or the economy. Climate change frames might refer to characters as interest groups, or as villains obstructing progress (Jones, 2014) or infer the person receiving the frame is a possible hero by calling them to action. A frame depicting a polar bear as a victim (Hart, 2011) is an example of character depictions within climate change framing research. Importantly, many of the internal characteristics mentioned in our discussion in the earlier section of this review (e.g., gender,

education, ideology, etc.) will be both attributes of the characters as well as attributes of the individuals exposed to the climate change narrative. In both cases, this will have meaningful impacts on how a narrative is received (Jones & Peterson, 2017).

The plot consists of the relationships of the characters to each other and the setting, usually distilled into a central theme. It can be as simple as attributing blame, such as establishing the deliberate or inadvertent harm of a villain (Crow & Berggren, 2014), or depicting the United States or China as the country responsible for climate change (Jang, 2013). It can also consist of multifaceted causal claims establishing interactions between elements of the setting (e.g., increased global temperatures), their cause(s) (e.g., anthropogenic), as well as character reactions to those causal assertions (e.g., rejection and acceptance coupled with action for or against). Examples of climate change framing plots identified in our review include attributing blame to greenhouse gas contributors (e.g., Jang, 2013), or establishing a moral authority to which actors are beholden (Howell et al., 2016).

The moral of the story is typically a solution to the identified problem or a call to action of some sort. Whether a frame is a mitigation or adaptation frame could be considered a very general moral of the story. But often, climate change mitigation and adaptation frames refer to specific solutions (Bilandzic et al., 2017; Gifford & Comeau, 2011; Morton et al., 2011) or calls to action (e.g., Semenza et al., 2011).

In the NPF, communication structure is accounted for by narrative structure. However, framing and narrative are not directly analogous (Crow & Lawlor, 2016; Shanahan et al., 2018). Consequently, we have added a fifth category to capture communication structures rooted specifically in framing theory, yet poorly fitted to the aforementioned narrative categories. For example, thematic vs. episodic frames (Hart, 2011) do not readily fit into the above categorization scheme.

It is our contention that most climate change framing research will speak to one or more of the above categories. Table 1 illustrates how this generally might apply.

Table 1. Examples of Narrative Aspects of Climate Change Framing Research

The Setting: The stage that a narrative plays out on, including specific geography, relevant facts, institutional configurations, and other dimensions specific to the context. For example, the impacts to a specific place or locale (e.g., Mir et al., 2016; Evans et al., 2014), concrete facts or potential benefits surrounding the issue (e.g., McCright et al., 2016) are all potential examples of a narrative setting.
Characters: Usually consists of victims who are harmed (or potentially so) such as the polar bear (Hart, 2011), a geographic place or locality (if anthropomorphized) (Singh et al., 2017; Spence & Pidgeon, 2010; Wiest et al., 2015), individuals (Hart & Nisbet, 2012; Severson & Coleman, 2015), villains who are responsible, such as greenhouse gas contributors (Jang, 2013), and a hero who brings promise of alleviating or reducing the harm (e.g., Jones, 2014),

which may often be bound up within the implicit or explicit calls for individuals to change behavior or support policies. Importantly, characteristics internal to individuals such as ideology (e.g., Levine & Klein, 2017;), education (e.g., Schuldt et al., 2011), and gender (e.g., Lockwood et al., 2011) will be both relevant in terms of how they are ascribed to characters in the narrative, as well as how they are distributed within those populations that are exposed to the narrative.

The Plot: Sets up the relationships between characters as well as between characters and their setting. Can include how audiences see themselves relating with climate change, through place attachment (Scannell & Gifford, 2013), projected future consequences (Bilandzic et al., 2017), or the potential outcomes, such as negative impacts on health (Petrovic et al., 2014; Semenza et al., 2014). Can also establish causality and blame (e.g., Jang, 2013) or an external moral authority to which actors are beholden (Howell et al., 2016). Many attribution frames noted in our review might usefully be categorized as plots.

The Moral of the Story: Relates to the point of a narrative. For example, a narrative might point to positive future outcomes and the avoidance of negative outcomes (Bilandzic et al., 2017; Gifford & Comeau, 2011; Morton et al., 2011), or a need for increased support for climate change mitigation and adaptation policies (specific or generally) and/or individual behavioral changes (e.g., Hart, 2011; Semenza et al., 2011).

The Communication Structure: These are aspects of climate change framing research and findings that do not readily fit into one of the above categories and likely speak to the structuring of the message itself. For example, the classic framing structure of episodic and thematic (Hart, 2011), resilience (McEvoy et al., 2013; Wong-Parodi, 2015), or equivalence frames (e.g., Bertolotti & Catellani, 2014; Hurlstone et al., 2014) might fall into this category.

NARRATIVE IMPLICATIONS FOR CLIMATE CHANGE FRAMING RESEARCH AND COMMUNICATION

Fitting existing or developing research to the NPF categories (Table 1) is a straightforward process that can be done in great detail, such as that when climate framing research specifically incorporates the concept of narrative into research designs (e.g., Jones, 2014; Jones & Song, 2014), or it can also be done quite simply by researchers speaking briefly to the narrative told by their research in terms of the above categories, even if only briefly in the discussion sections of articles. The benefits of either approach—simple or complex—to both

researchers and climate change communicators are likely manifold, especially in so much that it builds a communicative causeway between the two communities.

There is a substantial amount of scholarship across multiple academic disciplines that indicates that human beings use narrative as both their primary heuristic for cognitively organizing information and for communicating (Jones & McBeth, 2010). Therefore, it follows attempts to organize research and/or speak specifically to the narrative facets of research, in terms of models and findings, will offer two explicit and direct benefits. First, the current ad hoc practice of fitting different findings, aspects of models, and the like into research designs can be more easily understood by everyone in terms of the narratives they tell and then related to other research stories more easily via the NPF's categorizations. This fits scholarship to the predominant and preferred way people understand the world and allows for ongoing integration of climate change framing research into a loose overarching narrative framework configuration that helps us to better understand the relationships across studies and the concepts within them. Second, findings can be fitted to scientific understandings of narrative communication (Crow & Jones, 2018; Jones & Crow, 2018), helping ensure more effective climate change communication of complex scientific information to the lay public.

As Nisbet and Mooney (2007) suggest in their cornerstone piece on framing as a method for scientific communication, if scientific fact was the only tool needed to convince the public of the gravity of climate change, climate change policies would be less controversial and more widely supported. Simultaneously, low levels of scientific illiteracy allow the media to exploit this misunderstanding and frame climate change as a contentious and debatable issue, despite the apparent facts (Boykoff, 2007). However, the climate change framing literature demonstrates that a variety of individual internal determinants (e.g., ideology and partisanship) are stronger influencers on a person's actions and ideas than scientific facts, and the way information is framed can have highly variable effects. Therefore, the literature on climate change framing communication as a whole tells us that attempting to change a person's opinion through facts or by completely altering their entrenched beliefs is a hopeless endeavor but focusing instead on communicating the facts within a frame the person understands and agrees with is likely to be more successful (Lakoff, 2010). As Jones and Peterson (2017) demonstrate, using a narrative about climate change that relates to a person's worldview can increase understanding of policy decisions and the need for climate change policies. Here we augment that case by helping to build a bridge between research and communication, hopefully helping researchers contribute more directly, and meaningfully, to this now existential endeavor.

References

Ahchong, K., & Dodds, R. (2012). Anthropogenic climate change coverage in two Canadian newspapers, the Toronto Star and the Globe and Mail, from 1988 to 2007. *Environmental Science & Policy*, *15*(1), 48-59.

Akerlof, K., Maibach, E.W., Fitzgerald, D., Cedeno, A.Y., and Neuman, A. (2013). Do people "personally experience" global warming, and if so how, and does it matter? *Global Environmental Change*, 23: 81-91.

Azmi, N. J., Omar, N. A. M., Zaid, S. B. M., Wahab, Z., & Yusof, A. (2015). Media portrayal on global climate change: An analysis of Malaysian mainstream newspapers. *Studies in Media and Communication*, *3*(1), 73-78.

Altinay, Z. (2017). Visual communication of climate change: Local framing and place attachment. *Coastal Management*, *45*(4), 293-309.

Bain, P. G., Hornsey, M. J., Bongiorno, R., & Jeffries, C. (2012). Promoting pro-environmental action in climate change deniers. *Nature Climate Change*, *2*(8), 600.

Baumer, E. P., Polletta, F., Pierski, N., & Gay, G. K. (2017). A simple intervention to reduce framing effects in perceptions of global climate change. *Environmental Communication*, *11*(3), 289-310.

Benjamin, D., Por, H., and Budescu, D. (2017). Climate Change Versus Global Warming: Who is Susceptible to the Framing of Climate Change? *Environment and Behavior*, 49(7): 745-770.

Berinsky, A. J., & Kinder, D. R. (2006). Making sense of issues through media frames: Understanding the Kosovo crisis. *The Journal of Politics*, *68*(3), 640-656.

Bertolotti, M. and Catellani, P. (2014). Effects of message framing in policy communication on climate change. *European Journal of Social Psychology*, 44(5): 474-486.

Bilandzic, H., Kalch, A., and Soentgen, J. (2017). Effects of Goal Framing and Emotions on Perceived Threat and Willingness to Sacrifice for Climate Change. Science Communication, 39(4): 466-491.

Bosomworth, K. (2015). Climate change adaptation in public policy: Frames, fire management and frame reflection. *Environment and Planning C: Government and Policy*, 33: 1450-1466.

Boykoff, M. T. (2007). From convergence to contention: United States mass media representations of anthropogenic climate change science. *Transactions of the Institute of British Geographers*, *32*(4), 477-489.

Boykoff, M. T., and Boykoff, J. M. (2007). Climate change and journalistic norms: A case-study of US mass-media coverage. *Geoforum*, *38*(6), 1190-1204.

Boykoff, M.T., and Roberts, J.T. (2007). Media Coverage of Climate Change: Current Trends, Strengths, Weaknesses. United National Development Programme-Human Development Report 2007, http://hdr.undp.org/en/content/media-coverage-climate-change.

Bushell, S., Workman, M., and Colley, T. (2016). Towards a unifying narrative for climate change. Grantham Institute Briefing Paper No 18, April 2016. Imperial College London.

Cacciatore, M. A., Scheufele, D. A., & Iyengar, S. (2016). The end of framing as we know it… and the future of media effects. *Mass Communication and Society*, *19*(1), 7-23.

Carrico, A.R., Truelove, H.B., Vandenbergh, M.P. and Dana, D. (2015). Does learning about climate change adaptation change support for mitigation? *Journal of Environmental Psychology*, 41: 19-29.

Chong, D. and Druckman, J.N. (2007). Framing Theory. *Annual Review Political Science*, 10: 103-126.

Christie, I. (2010). How to confuse friends and alienate people: mixed messages and climate change communication in UK politics. In Rowley, S. and Phillips, R. (Eds) From hot air to happy endings: How to inspire public support for a low carbon society, 16-21. London, UK: Green Alliance.

Crow, D., & Jones, M. (2018). Narratives as tools for influencing policy change. *Policy & Politics*, *46*(2), 217-234.

Crow, Deserai A., and Andrea Lawlor. "Media in the policy process: using framing and narratives to understand policy influences." *Review of Policy Research* 33, no. 5 (2016): 472-491.

Devine-Wright, P., Price, J. and 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.

Dewulf, A. (2013). Contrasting frames in policy debates on climate change adaptation. *WIREs Climate Change,* 4: 321-330.

Dickinson, J.L., Crain, R., Yalowitz, S., and Cherry, T.M. (2013). How framing climate change influences citizen scientists' intentions to do something about it. *The Journal of Environmental Education*, 44(3): 145-158.

De Vreese, C.H., Peter, J., Semetko, H.A. (2001). Framing politics at the launch of the Euro: A cross-national comparative study of frames in the news. *Political communication*, *18*(2), 107-122.

Dewulf, A. (2013). Contrasting frames in policy debates on climate change adaptation. *Wiley Interdisciplinary Reviews: Climate Change*, *4*(4), 321-330.

Evans, L., Milfont, T.L., and Lawrence, J. (2014). Considering local adaptation increases willingness to mitigate. *Global Environmental Change*, 25: 69-75.

Feinberg, M., and Miller, R. (2011). Apocalypse Soon? Dire Messages Reduce Belief in Global Warming by Contradicting Just-World Beliefs. *Psychological Science*, 1: 34-38.

Ford, J. D., & King, D. (2015). Coverage and framing of climate change adaptation in the media: A review of influential North American newspapers during 1993–2013. *Environmental Science & Policy*, *48*, 137-146.

Gifford, R. and Comeau, L.A. (2011). Message framing influences perceived climate change competence, engagement, and behavioral intentions. *Global Environmental Change*, 21(4): 1301-1307.

Goffman, E. (1974). *Frame Analysis: An Essay on the Organization of Experience*. New York: Harper & Row.

Hardisty, D.J., Johnson, E.J., and Weber, E.U. (2010). A Dirty Word or a Dirty World? Attribute Framing, Political Affiliation, and Query Theory. *Psychological Science*, 12(1): 86-92.

Harris, P.G. (2007). Collective Action on Climate Change: The Logic of Regime Failure. *Natural Resource Journal*, 47(1): 195-224.

Hart, P.S. and Nisbet, E.C. (2012). Boomerang Effects in Science Communication: How Motivated Reasoning and Identity Cues Amplify Opinion Polarization About Climate Mitigation Policies. *Communication Research*, 39(6): 701-723.

Hart, P.S. (2011). One or many? The influence of episodic and thematic climate change frames on policy preferences and individual behavior change. *Science Communication*, 33(1): 28-51.

Holling, C. S. (1973). Resilience and stability of ecological systems. *Annual review of ecology and systematics*, *4*(1), 1-23.

Howe, P.D. and Leiserowitz, A. (2013). Who remembers a hot summer or a cold winter? The asymmetric effect of beliefs about global warming on perceptions of local climatic conditions in the U.S. *Global Environmental Change*, 23: 1488-1500.

Howell, R.A., Capstick, S., and Whitmarsh, L. (2016). Impacts of adaptation and responsibility framings on attitudes towards climate change mitigation. *Climatic Change*, 136(3-4): 445-461.

Hurlstone, M.J., Lewandowsky, S., Newell, B.R., and Sewell, B. (2014). The effect of framing and normative messages in building support for climate policies. *PloS One*, 9(12): e114335.

Intergovernmental Panel on Climate Change. (2015). *Climate change 2014: Mitigation of climate change* (Vol. 3). Cambridge University Press.

IPCC. (2018) Summary for Policymakers. In: Global warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways,in the context of strengthening the global response to the threat of climate change, sustainable development,and efforts to eradicate poverty V. Masson-Delmotte, P. Zhai, H. O. Pörtner, D. Roberts, J. Skea, P. R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J. B. R. Matthews, Y. Chen, X. Zhou, M. I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, T. Waterfield (eds.), World Meteorological Organization, Geneva, Switzerland, 32 pp.

Iyengar, S. (1994). *Is anyone responsible?: How television frames political issues*. University of Chicago Press.

Jang, S.M. (2013). Framing responsibility in climate change discourse: Ethnocentric attribution bias, perceived causes, and policy attributes. *Journal of Environmental Psychology*, 36: 27-36.

Jones, M. D. (2014). Cultural characters and climate change: How heroes shape our perception of climate science. *Social Science Quarterly*, *95*(1), 1-39.

Jones, M., & Crow, D. (2017). How can we use the 'science of stories' to produce persuasive scientific stories?. *Palgrave Communications*, *3*(1), 53.

Jones, M. D., & McBeth, M. K. (2010). A narrative policy framework: Clear enough to be wrong?. *Policy Studies Journal*, *38*(2), 329-353.

Jones, M. D., & Peterson, H. (2017). Narrative persuasion and storytelling as climate communication strategies. In *Oxford Research Encyclopedia of Climate Science*.

Jones, M. D., & Song, G. (2014). Making sense of climate change: How story frames shape cognition. *Political Psychology*, *35*(4), 447-476.

Kahneman, D. and Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, 47(2): 263.

Kellstedt, P. M., Zahran, S., & Vedlitz, A. (2008). Personal efficacy, the information environment, and attitudes toward global warming and climate change in the United States. *Risk Analysis: An International Journal*, *28*(1), 113-126.

Kinder, D. R. (2007). Curmudgeonly advice. *Journal of Communication*, *57*(1), 155-162.

Lakoff, G. (2010). Why it Matters How We Frame the Environment. *Environmental Communication*, 4(1): 70-81.

Levine, A.S. and Kline, R. (2017). A new approach for evaluating climate change communication. *Climatic Change*, 142(1-2): 301-309.

Lockwood, M. (2011). Does the framing of climate policies make a difference to public support? Evidence from UK marginal constituencies. *Climate Policy*, *11*(4), 1097-1112.

Lu, H., and Schuldt, J.P. (2016). Compassion for climate change victims and support for mitigation policy. *Journal of Environmental Psychology*, 45: 192-200.

Maibach, E.W., Nisbet, M., Baldwin, P., Akerlof, K., and Diao, G. (2010). Reframing climate change as a public health issue: an exploratory study of public reactions. BMC Public Health, 10(1): 299.

Maibach, E. W., Roser-Renouf, C., & Leiserowitz, A. (2008). Communication and marketing as climate change–intervention assets: A public health perspective. *American journal of preventive medicine*, *35*(5), 488-500.

Marquart-Pyatt, S. T., Shwom, R. L., Dietz, T., Dunlap, R. E., Kaplowitz, S. A., McCright, A. M., & Zahran, S. (2011). Understanding public opinion on climate change: a call for research. *Environment: Science and Policy for Sustainable Development*, *53*(4), 38-42.

McCright, A.M., Charters, M., Dentzman, K., and Dietz, T. (2016). Examining the Effectiveness of Climate Change Frames in the Face of a Climatic Change Denial Counter-Frame. Topics in Cognitive Science, 8(1): 76-97.

McCright, A.M. and 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.

McEvoy, D., Fünfgeld, H., and Bosomworth, K. (2013). Resilience and climate change adaptation: the importance of framing. *Planning Practice & Research*, 28(3): 280-293.

Mir, H.M., Behrang, K., Isaai, M.T., and Nejat, P. (2016). The impact of outcome framing and psychological distance of air pollution consequences on transportation mode choice. *Transportation Research Part D*, 46: 328-338.

Morton, T.A., Rabinovich, A., Marshall, D., and 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. and Dilling, L. (2007). Communicating Climate Change: Closing the Science-Action Gap. T*he Oxford Handbook of Climate Change and Society*. England: Oxford University Press.

Myers, T.A., Nisbet, M.C., Maibach, E.W. and Leiserowitz, A.A. (2012). A public health frame arouses hopeful emotions about climate change. *Climatic Change*, 113(3-4): 1105-1112.

Nisbet, E.C., Hart, P.S., Myers, T., and Ellithorpe, M. (2013). Attitude change in competitive framing environments? Open-/closed-mindedness, framing effects, and climate change. *Journal of Communication*, 63(4): 766-785.

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. and Mooney, C. (2007). Framing Science. *Science*, 316: 56.

Olausson, U. (2009). Global warming-global responsibility? Media frames of collective action and scientific certainty. *Public Understanding of Science*, 18: 421-436.

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

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

O'Neill, S.J. and Nicolson-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.

Parag, Y., Captick, S., Poortinga, W., (2011). Policy Attribute Framing: A Comparison Between Three Policy Instruments For Personal Emissions Reductions. J*ournal of Policy Analysis and Management,* 30(4): 889-905.

Petrovic, N. Madrigano, J., and Zaval, L. (2014). Motivating mitigation: when health matters more than climate change. *Climate Change*, 126(1-2): 245-254.

Sapiains, R., Beeton, R. J., & Walker, I. A. (2016). Individual responses to climate change: Framing effects on pro-environmental behaviors. *Journal of Applied Social Psychology*, *46*(8), 483-493.

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

Schmidt, A., Ivanova, A., & Schäfer, M. S. (2013). Media attention for climate change around the world: A comparative analysis of newspaper coverage in 27 countries. *Global Environmental Change*, *23*(5), 1233-1248.

Schuldt, J. P., Konrath, S. H., & Schwarz, N. (2011). "Global warming" or "climate change"? Whether the planet is warming depends on question wording. *Public Opinion Quarterly*, *75*(1), 115-124.

Semenza, J.C., Ploubidis, G.B., and George, L.A. (2011). Climate change and climate variability: personal motivation for adaptation and mitigation. *Environmental Health*, 10(46): 1-12.

Severson, A.W. and Coleman, E.A. (2015). Moral Frames and Climate Change Policy Attitudes. *Social Science Quarterly*, 96(5): 1277-1290.

Shanahan, Elizabeth A., Eric D. Raile, Kate A. French, and Jamie McEvoy. "Bounded Stories." *Policy Studies Journal* 46, no. 4 (2018): 922-948.

Shehata, A. and Hopmann, D.N. (2012). Framing Climate Change: A study of US and Swedish press coverage of global warming. *Journalism Studies*, 13(2): 175-192.

Singh, A.S., Zwickle, A., Bruskotter, J.T., and Wilson, R. (2017). The perceived psychological distance of climate change impacts and its influence on support for adaptation policy. *Environmental Science & Policy*, 73: 93-99.

Spence, A. and Pidgeon, N. (2010). Framing and communicating climate change: The effects of distance and outcome frame manipulations. Global Environmental Change, 20(4): 656-667.

Takahashi, B., & Meisner, M. (2013). Climate change in Peruvian newspapers: The role of foreign voices in a context of vulnerability. *Public Understanding of Science*, *22*(4), 427-442.

Ung, M., Luginaah, I., Chuenpagdee, R., and Campbell, G. (2015). Perceived Self-Efficacy and Adaptation to Climate Change in Coastal Cambodia. *Climate*, 4(1): 1-16.

U.S. Global Change Research Program. (2017). *Climate Science Special Report: Fourth National Climate Assessment, Volume I*. Washington, DC, USA.

Weaver, C. P., Moss, R. H., Ebi, K. L., Gleick, P. H., Stern, P. C., Tebaldi, C., ... & Arvai, J. L. (2017). Reframing climate change assessments around risk: recommendations for the US National Climate Assessment. *Environmental Research Letters*, *12*(8), 080201.

Weiner, B. (1985). An Attributional Theory of Achievement Motivation and Emotion. *Psychological Review*, 92(4), 548-573.

Wiest, S.L., Raymond, L., and Clawson, R.A. (2015). Framing, partisan predispositions, and public opinion on climate change. *Global Environmental Change*, 31:187-198.

Wong-Parodi, G., Fischhoff, B., and Stauss, B. (2015). Resilience vs. Adaptation: Framing and Action. *Climate Risk Management*, 10:1-7.

World Bank Group. (2016). *Global Monitoring Report 2015/2016: Development Goals in an Era of Demographic Change.* Washington, DC: World Bank. DOI: 10.1596/978-1-4648-0669-8.