Climate change communication: Challenges, insights, and opportunities

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3.1 Introduction

Despite the widely lauded, landmark Paris Agreement reached by the planet's nations in 2015, serious questions and doubts about the international community's ability to act in concert on climate change remain. The populist and largely isolationist political uprisings of 2016 (e.g., U.S. presidential election, "Brexit" in the United Kingdom) in particular highlight the continued challenges we collectively face in effectively confronting this challenging collective action problem. Although not accepted or identified universally as a key driver of these challenges, many scientists, policymakers, issue advocates, and others point to relatively weak public engagement with the issue as a core barrier to intra- and international action on climate change (e.g., Hulme, 2009; Weber & Stern, 2011). In the United States in particular, much attention has been paid to citizens' attitudes, beliefs, knowledge, and preferences (political and behavioral) about the issue (e.g., Kahan et al., 2012; Leiserowitz, 2006; Whitmarsh, 2011). Hundreds of public opinion polls and surveys have consistently revealed significant heterogeneity amongst Americans with respect to nearly every aspect of their engagement (e.g., cognitive, affective, behavioral) with climate change (e.g., Leiserowitz, Maibach, Roser-Renouf, Feinberg, & Rosenthal, 2016; Pew Research Center, 2016); this heterogeneity stands in stark contrast to the strong consensus that exists amongst scientists who study climate change and are intimately familiar with what is currently known to science about the phenomenon (see Cook et al., 2016; Pew Research Center, 2015).

Although issue advocates, academics, and others have called for a variety of responses to address the observed heterogeneity of public engagement with climate change, perhaps none has received as enthusiastic an embrace as the call for "better communication" of the issue. As Susanne Moser and others have detailed (e.g., McCright & Dunlap, 2010; Moser, 2010), efforts to engage the public on the issue of climate change through communication, often but not always with the aim of increasing support for ameliorative action, have a long history, reaching back at least three decades (e.g., James Hansen's congressional testimony in 1988; McKibben, 1989).

For the purposes of the present chapter, *climate change communication* (CCC) refers to any effort—explicit or otherwise—that aims to raise public awareness,

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understanding, and/or active engagement with the issue (Moser, 2010). Such a broad definition of CCC is necessary because so many approaches to communicating with the public on this issue have been developed and implemented by a diverse array of communicators. These include "traditional" advertising campaigns (e.g., Environmental Defense Fund's "Train" ad) and one-off pieces of communication (e.g., Al Gore's *Inconvenient Truth*, Showtime's *Years of Living Dangerously*) as well as more participatory formal and informal activities and events (e.g., town meetings, future visioning and scenario planning exercises, public art installations). Of course, the everyday conversations we all have with family, friends, and acquaintances about climate change, rare as they may be (e.g., Geiger & Swim, 2016), represent another critically important, if informal, form of CCC (Leiserowitz, Maibach, Roser-Renouf, Rosenthal, & Cutler, 2017; Moser, 2010).

As concern over climate change has increased in recent years amongst many scientists, business owners, resource managers, and policymakers, the public's level of concern has stayed relatively stable or increased only slightly over the past decades according to reports by Gallup (Saad, 2017), Yale Program on Climate Change Communication (Leiserowitz et al., 2017), and the Pew Research Center (2015). This growing disconnect (Pew Research Center, 2015) has in turn driven interest in finding ways to make the issue more salient and pressing to a broader swath of the public. To many, this apparently stubborn gap highlights the shortcomings of many past and existing efforts to communicate the severity and pressing nature of the issue (e.g., CRED & ecoAmerica, 2014; but see McCright & Dunlap, 2010 for an alternative account). In an effort to better understand the shortcomings of extant CCC efforts, and in some cases to provide evidence-based suggestions for improvement, social scientists from a variety of disciplines including psychology, communications, political science, and sociology began studying how individuals respond to various types and forms of CCC (e.g., Cook, in press; O'Neill & Nicholson-Cole, 2009; Spence & Pidgeon, 2010; Sterman, 2008; Whitmarsh, 2009). Over the past 5−10 years, this multidisciplinary field of study has exploded (see Fig. 3.1), providing the evidence base for more considered and perhaps effective efforts at communicating this issue to the public. Multiple attempts to integrate these disparate findings into concrete recommendations for communicators "on the ground" now exist (e.g., Climate Outreach, 2015; Corner & Clarke, 2017; CRED & ecoAmerica, 2014; Moser, 2010; Taylor, 2012).

One of the most consistent and clear findings of this work is that disagreements about climate change (e.g., whether it is anthropogenic, whether it is a serious problem, whether we should take costly action to combat it) are very infrequent disagreements *over "the facts"* (Kahan et al., 2012). Instead, at their core, disagreements about climate change are fundamentally tied to the *implications the issue holds for society and the way it is organized*, including how we produce, use, and pay for energy and other resources (Hulme, 2009; Kahan, 2015). The implications of this core finding for increasing the effectiveness of CCC efforts are both profound and simple: throwing more and more facts about the problem at people is extremely unlikely to shift minds and hearts in any appreciable way.

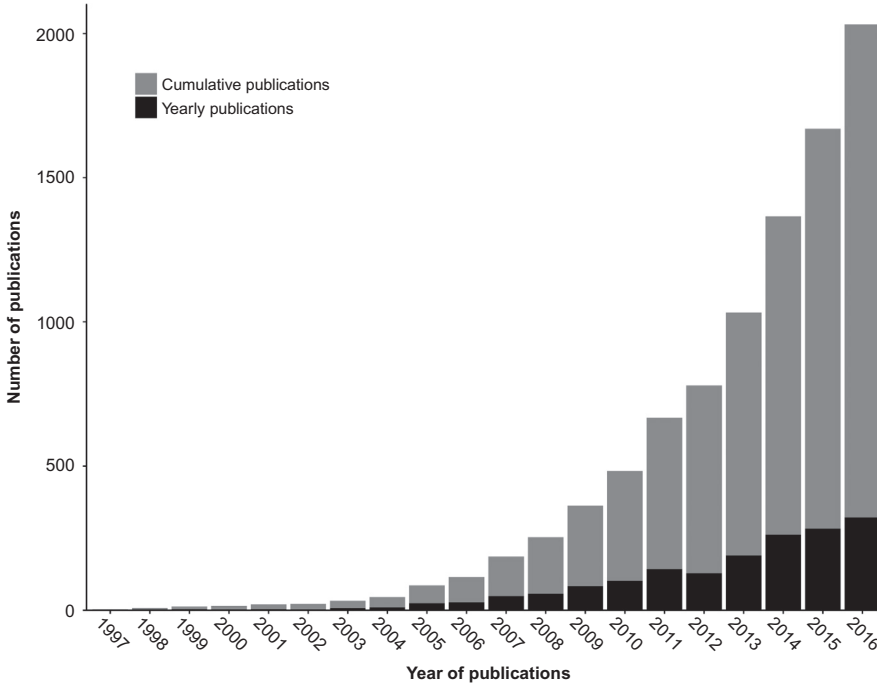

Figure 3.1 A Web of Science search was conducted to examine the growth of climate science communication research from 1997 to 2016. A topical search using the abridged search terms, climat* NEAR chang* AND communicat* allowed for broader inclusion of relevant articles (e.g., compared to title or keyword searches), as well as the inclusion of variations in the targeted search terms (e.g., communication versus communicating, etc.). Initial search returned $N = 3621$ entries; however, after manually screening for unrelated material (e.g., changes in business climates), as well as entries suggesting proscriptive communication needs, $N = 1709$ entries remained. Given the limitations of Web of Science and the search criteria, the above figure should be viewed as a conservative estimate characterizing growth in the field over the past two decades.

Indeed, as described in more detail below, this sort of deficit-model-based approach—one that assumes a lack of factual knowledge is the key barrier to greater issue engagement—may not only be ineffective, it may actually be detrimental to improving public engagement by causing counterproductive backfire effects (Cook, in press). This is particularly likely to happen among antagonistic and skeptical audiences (e.g., Hart & Nisbet, 2012). Instead, communicators need to develop new approaches to CCC that incorporate what we now know about the psychological and social factors that shape individuals' engagement with this issue (for a review, see Gifford, 2011; Swim et al., 2009). This means first understanding why climate change is in fact a very challenging issue to communicate about before incorporating evidence-supported best practices into CCC efforts.

3.2 Why is climate change communication so challenging?

Climate change is a uniquely challenging issue from a science communication and public engagement perspective; indeed, we might refer to it as a "perfect communications storm," much as Gardiner (2011) has referred to it as a "perfect moral storm." Why? Because it poses challenges on multiple fronts, from its inherent abstractness and complexity to the myriad social and psychological defense mechanisms it activates to the fact that its slow-moving nature makes it a challenge for journalists and media outlets to cover on a regular basis (Boykoff, 2011; Boykoff & Boykoff, 2007). Understanding these and other various challenges provides a useful starting point for those interested in developing more effective forms of CCC.

3.2.1 Challenge 1: The problem itself

Climate change is, as many advocates and communicators have long bemoaned, a slow-moving, long-term, complex, abstract phenomenon (IPCC, 2014). It is not an "in-your-face" type of problem (Gardiner, 2011): its impacts are diffuse and largely expected to occur in the future; relatively few people are directly impacted by its effects currently; attributing specific negative outcomes to climate change is challenging; it is largely a side-effect of normal, daily behavior, not intentionally caused; and it lacks many of the typical features that support engagement with and attention toward other societal risks, including obvious culprits, personally known victims, and a sense of urgency (Markowitz & Shariff, 2012). It is, in a word, deeply *un-relatable* at the personal level for most individuals (e.g., Spence, Poortinga, & Pidgeon, 2012).

These features of the phenomenon pose additional challenges from a communications and public engagement perspective. For example, it has been argued that media outlets' and journalists' financial incentives and institutional norms have in the past encouraged exaggeration of uncertainties that exist as well as the production of false narratives of equivalence between climate scientists and skeptics (Boykoff & Boykoff, 2007). There are also many other issues begging for the limited attention of the public. It does not grab front-page attention on a regular basis. Indeed, news coverage of climate change has been declining for the past decade (Nacu-Schmidt et al., 2016). In general, it is perceived as a low-importance issue relative to nearly all other challenges facing society, from economic development to global political instability to public health to most other environmental problems (Pew Research Center, 2014; Riffkin, 2014). Moreover, it is a challenging issue to keep people interested in over time, in part because the pace of change and new developments is quite slow compared to the time scales of days, weeks, months, and possibly a few years that people are used to thinking in. Thus, the "physical" features of the phenomenon itself pose significant challenges to communicators in

terms of both capturing people's attention and keeping it long enough to truly engage them with the issue.

3.2.2 Challenge 2: Cultural conflict and polarization

Because climate change *is not* an immediately obvious and directly experienced phenomenon, people's understandings of and beliefs about the issue are largely mediated through the various messages and messengers they are most often exposed to (and their interpretations of those messages, see *Challenge 3*). Combined with extreme levels of elite polarization regarding climate change (Brulle, Carmichael, & Jenkins, 2012; Dunlap, McCright, & Yarosh, 2016) and deeply partisan media exposure patterns (Feldman, Myers, Hmielowski, & Leiserowitz, 2014; Jasny, Waggle, & Fisher, 2015; Williams, McMurray, Kurz, & Lambert, 2015), this basic fact goes a long way toward explaining how climate change has come to be the single most politically polarizing issue among American adults (Pew Research Center, 2016). Indeed, in terms of issue concern and engagement, the gap between Republicans and Democrats on climate change is as large or larger than it is for any other issues (see Pew Research Center, 2016).

This remarkable level of polarization highlights what may be the single most challenging, and stubborn, barrier to effective CCC, namely, the deep cultural conflict that exists around this issue. Climate change has become infused with deeply antagonistic political and group-identity meanings, such that "beliefs" about the issue have, some argue, essentially become proxies for political group membership and identity: what it means to be a "good" Republican is to be skeptical about the reality and urgency of climate change, whereas what it means to be a "good" Democrat is to see climate change as an existential threat in need of large-scale societal response (Kahan, 2015). These meanings have attached to the issue due to a number of interconnected factors: the implications the issue holds for the global economy; intentional efforts by vested interests to create uncertainty and division (Oreskes & Conway, 2011); and, well-meaning but counter-productive communications efforts by issue advocates over the past two decades (Nisbet, 2009). As a result, communicators' decisions about how to frame the issue, which audiences to engage, which messengers to employ, and which outcomes to target (e.g., attitude change, behavior, policy support) are fraught, to say the least.

The presence of this cultural divide on climate change strongly suggests that a one-size-fits-all approach to communication is extremely unlikely to work (CRED & ecoAmerica, 2014; ecoAmerica, 2016a). This in turn highlights the need for tailored communications efforts (Bolsen & Shapiro, in press), which are easy to call for in theory but challenging to implement in practice, for example, due to challenges involved in identifying appropriate audiences and cross-contamination of messages and channels (see Hine, Phillips, Driver, & Morrison, in press). Yet it is also clear that ignoring the cultural and group-identity underpinnings of disagreement over climate change is not an option for communicators interested in meaningfully engaging audiences (Feygina, Jost, & Goldsmith, 2010; Kahan, 2015).

3.2.3 Challenge 3: Psychological barriers to engagement and communication

Making matters worse, many of these challenging features of the problem itself (e.g., complexity, uncertainty, abstractness, political polarization) interact with the ways in which people's minds operate to further depress issue engagement and create even more barriers for communicators (Gifford, 2011; Markowitz & Shariff, 2012). For example, a number of recent studies suggest that persistent scientific uncertainties regarding climate change (e.g., timing and severity of impacts) can work to undermine people's issue engagement (Budescu, Por, & Broomell, 2012; Ho, Budescu, & Pu, in press; Joslyn & LeClerc, 2016), in part by activating cognitive mechanisms that promote wait-and-see attitudes (Sterman, 2008) and/or unrealistic optimism about future outcomes (Markowitz & Shariff, 2012). This suggests that communicators face significant challenges in deciding how to talk about what is known and what remains uncertain regarding climate change impacts; these problems are amplified by pervasive, and successful, efforts by certain organizations and vested interests to make the science around climate appear more uncertain than it in fact is (Dunlap & McCright, 2010; Oreskes & Conway, 2011).

As described in detail elsewhere (see Bolsen & Shapiro, in press; Gifford, 2011; Stoknes, 2015; Swim et al., 2009; Swim, Markowitz, & Bloodhart, 2012; Whitmarsh, 2009), a variety of basic, and primarily unconscious, psychological processes that powerfully shape everything from how people search for and process information, to the development of attitudes and risk perceptions, to how people ultimately make decisions, often work against the rapid and unbiased uptake of information and messages about climate change. For example, much research has revealed that people not only seek out information about climate change that reinforces their preexisting beliefs (e.g., Feldman et al., 2014), but also that they interpret new information they are exposed to in ways that promote polarization and attitude crystallization (e.g., Hart & Nisbet, 2012; Hart, Feldman, Leiserowitz, & Maibach, 2015; Kahan et al., 2012; Nyhan & Reifler, 2010). People tend to be more critical of and willing to counter-argue evidence they encounter that challenges their existing beliefs but are much less critical of supportive evidence (e.g., Lord, Ross, & Lepper, 1979). These unconscious biases pose a major challenge to communicators given the potent combination that currently exists in the United States of a fractured, politicized media landscape, and the deeply ingrained elite political polarization around climate change discussed above (McCright & Dunlap, 2011; Pew Research Center, 2016).

Work by Kahan, Braman, Gastil, Slovic, and Mertz (2007a) and Kunda (1990) on "identity-protective cognition" provides one plausible mechanism by which partisan differences in issue engagement, and hence receptivity to communication efforts, become entrenched and reinforced over time. According to Kahan, Braman, Slovic, Gastil, and Cohen (2007b), Kahan et al. (2012) and Kahan (2015), individuals are strongly motivated to form perceptions of risks, including those related to climate change, that support their overarching sense of who they are, that is, that reinforce their identity. Because our identities are closely tied to our social groups

and preferences for how society is organized, a motivation to protect one's identity can result in different groups of people coming to see particular risks or issues, e.g., climate change, in highly divergent ways. However, understanding the role that "identity-protective cognition" may play in this domain also points the way toward possible "antidotes" to such polarization, as described in more detail below.

In addition to these directional or "motivated" psychological barriers to CCC, communicators face other cognitive and affective (emotional) challenges as well. For example, low issue salience and lack of direct, personal experience mean that climate change is simply not a top-of-mind issue for the vast majority of Americans, as described above; as such, simply getting people to pay attention to communications efforts is challenging. In addition, Lertzman (2015) and others have argued that when people *do* start paying attention to issue advocates, the problem can rapidly come to be perceived as overwhelming. In turn, this can lead people to emotionally and cognitively shut down and, in some cases, actively avoid learning more about the issue (see also Norgaard, 2011; Ungar, 2000). Thus, communicators also face a major hurdle in finding ways to engage audiences that simultaneously highlight the salience of the issue and need for immediate action while *not* making the situation appear hopeless (Feinberg & Willer, 2011). Work by O'Neill and Nicholson-Cole (2009) and O'Neill, Boykoff, Niemeyer, and Day (2013) suggests that such messages, including those that use visual imagery, are hard to come by (see also Chapman, Corner, Webster, & Markowitz, 2016). Indeed, much work in the risk communication literature across multiple domains highlights the critical need for communicators to support feelings of efficacy when discussing personally threatening issues (Hart & Feldman, 2016; Hornsey et al., 2015; Milfont, 2012; Witte & Allen, 2000), something not easily done in the context of climate change. This is particularly true in the current political climate.

3.3 Improving climate change communication efforts

In the face of so many varied, intertwined, and synergistic challenges to effectively engaging with nonexperts on the issue of climate change, many would be forgiven for giving up in despair. Yet a rapidly growing, multidisciplinary body of research and practice suggests that more effective approaches to climate communication *are* possible; indeed, scholars and practitioners are engaged in a wide variety of innovative efforts to effectively communicate about climate change (e.g., ecoAmerica's Let's Talk series, 2016b; Shaw et al., 2009; Southeast Climate Compact, n.d.). Many are finally moving beyond deficit model-based approaches (Ockwell, Whitmarsh, & O'Neil, 2009; Wibeck, 2014) and embracing the insights produced over the past decade by psychological, communications, public engagement, and other scholars on the ways in which individuals (dis)engage with this issue to improve communications efforts on the ground. Here we describe seven key considerations drawn from this growing and rapidly evolving evidence base (Table 3.1).

Table 3.1 Seven insights to improve climate change communication

Know what motivates the audience. Identify and understand how values, identities, worldviews, etc. differentially shape audiences' engagement with climate change and tailor communication efforts to their needs
Figure out what the audience already knows. Start where people are at: preexisting beliefs and experiences with climate change and climate-related events shape how individuals interpret and filter new information
Confront false information, do not reinforce it. Dislodge false beliefs with simple, factual alternatives, and leverage preemptive warning messages to prevent the uptake of misinformation
Find frames that "fit" audiences' needs. Package and connect climate change information to the needs and values that matter to your audiences (e.g., public health, responsibility, local impacts)
Highlight solutions. Encourage engagement and build individuals' feelings of efficacy and hopefulness by focusing on solutions
Tell stories. Use coherent narrative forms and include story elements such as characters and problem resolution to make messages more compelling and relatable
Leverage the right messengers and communication channels. Identify and work with existing social networks, communication channels, and trusted "in-group" messengers

3.3.1 Insight 1: Know what motivates the audience

A key tenet of persuasive communication—perhaps the most important one—is to "know one's audience" (CRED & ecoAmerica, 2014). After all, how can one know what pieces of information or ways of framing that information will be persuasive or even how best to get the attention of the audience (e.g., through which channels) without first knowing something about those individuals: what motivates them, what they value, what their constraints and barriers are to greater issue engagement, and, who they listen to and respect. One implication of attempting to address these questions is that a "one-size-fits-all" approach to CCC is extremely unlikely to produce significant *positive* outcomes (see, e.g., Hart & Nisbet, 2012). In part, this is due to the deeply antagonistic cultural meanings now attached to climate change (see discussion of *Challenge 2*; also, Feygina et al., 2010; Kahan et al., 2012) and in part to the simple fact that different people are motivated by different core values, concerns, and needs (Rokeach, 1973). For example, individuals who are strongly motivated by self-enhancement values are unlikely to respond positively to exhortations to "sacrifice for the well-being of future generations." Conversely, communication efforts that highlight the personal economic benefits of taking action on climate change (e.g., reducing one's monthly energy bill) may actually inhibit greater engagement among individuals who see this as a fundamentally moral issue (Asensio & Delmas, 2015,2016). Thus, it has become readily apparent that communicators need to tailor messages and outreach efforts to fit particular audiences' needs and characteristics (Bostrom, Böhm, & O'Connor, 2013; Hine et al., in press; Perkowitz, Speiser, Harp, Hodge, & Krygsman, 2014).

The first step in tailoring communication involves identifying subgroups within a population who share core values, motives, beliefs, and existing mental models, an approach often referred to as "audience segmentation" (Hine et al., 2014). Although still in its infancy, the use of audience segmentation tools to support CCC efforts is growing (Hine et al., 2016; Maibach, Roser-Renouf, & Leiserowitz, 2008, 2009; Perkowitz et al., 2014). In some ways, the concept is simple: people who share common beliefs, values, and motives should be more likely to respond consistently and predictably to particular ways of communicating about climate change. Thus, communicators should use existing tools often used by social marketers, psychologists, and others (e.g., latent class analysis, McCutcheon, 1987) to identify coherent subgroups within the larger public, opening up the possibility of developing communications messages and strategies that speak directly to those groups' core interests and concerns (Hines et al., 2014; Maibach, Leiserowitz, Roser-Renouf, & Mertz, 2011).

The most widely recognized and cited effort to do this in the climate change domain is the *Six Americas* project (Leiserowitz, Maibach, Roser-Renouf, Feinberg, & Howe, 2013; Maibach et al. 2009), which groups people into six distinct groups (e.g., "Alarmed," "Dismissive," "Disengaged") based on their existing beliefs and concerns about climate change, e.g., is it happening, is it a risk, is it human caused. Other researchers have similarly used climate change-specific beliefs and attitudes as the basis for categorizing individuals into groups that may respond differentially to various ways of framing the issue (e.g., Korkala, Hugg, & Jaakkola, 2014; Metag, Füchslinu, & Schäfer, 2015; Sibley & Kurz, 2013). However, such domain-specific, beliefs-based approaches to audience segmentation may not provide sufficient insight into the core motives and values of the different subgroups that have been identified (e.g., Corner, Whitmarsh, & Xenias, 2012), inhibiting the usefulness of such approaches in actually informing on-the-ground communication efforts. Instead, some researchers and practitioners have begun combining such issue-specific methods with a more traditional values-oriented, "psychographic" segmentation approach to identify subgroups that may respond in distinct ways to CCC efforts (e.g., Hine et al., 2016; Perkowitz et al., 2014; Poortinga & Darnton, 2016).

For communicators, the benefit of these approaches is that they can provide both deeper and broader insight into the values, motives, and cross-cutting concerns that communication approaches can tap into when developing messaging and engagement strategies (Hine et al., 2014; Whitmarsh, Lorenzoni, & O'Neill, 2012). For example, Hine et al. (2016) found that whereas certain messages engaged both dismissive and alarmed audiences, e.g., giving adaptation-specific advice, other messages increased engagement only amongst dismissive individuals, e.g., emphasizing local impacts (see also Bain, Hornsey, Bongiorno, & Jeffries, 2012; Benjamin, Por, & Budescu, 2016; Myers, Nisbet, Maibach, & Leiserowitz, 2012). Bain et al. (2012) similarly found that avoiding explicit mention of climate change and instead focusing on the societal, economic, or technological benefits of proenvironmental behavior increased climate-friendly action amongst dismissive individuals. And work by ecoAmerica (Perkowitz et al., 2014) has attempted to apply "psychographic" methods commonly used in marketing efforts to similarly help communicators better

understand how different segments of the population are likely to respond to various ways of framing climate change, e.g., as an economic opportunity versus a public health threat versus a personal responsibility. For example, they find that "achievers"—relatively high-resource, self- and family-focused individuals who often act as opinion leaders in their communities ("VALS" project; Strategic Business Insights, n.d.)—tend to be only moderately concerned about climate change and likely to be most strongly motivated by family- and responsibility-oriented concerns. Thus, appeals or messages that highlight how climate change may threaten families' well-being and security may productively engage that group.

3.3.2 Insight 2: Figure out what audiences already know

Why does it matter that communicators know their audiences well? Because people interpret and filter new information about climate change through their preexisting beliefs (e.g., mental models) and values (Kahan et al., 2007a,b; Kaplan & Kaplan, 2009; Morgan, Fischoff, Bostrom, & Atman, 2001). Thus, the same message or piece of information may, and likely will, be interpreted in very different ways by individuals who hold opposing worldviews or who hold very different understandings of how the climate system operates. This extends even to people's own personal experiences with climate-related events (e.g., extreme weather events). Recent work suggests that how people understand and interpret such experiences with respect to climate change, whether they connect them to the larger issue or not, differs depending on their political identity (Deryugina, 2013; Egan & Mullin, 2012; Hamilton & Stampone, 2013). These findings, in turn, suggest that the recent trend amongst some scientists, advocates, and journalists toward connecting particular extreme events with climate change in the hope of increasing issue salience (e.g., Trenberth, Fasullo, & Shepherd, 2015) may actually backfire amongst skeptical individuals and groups (e.g., Chapman & Lickel, 2016). An alternative but related approach—highlighting how individuals and communities can prepare for the *next* major event—may be more likely to successfully engage a wider audience by circumventing problematic ideological entanglements, although this remains to be seen.

Knowing what people already believe about climate change can also improve communication efforts by helping communicators identify easily understood words and concepts, correct for common misconceptions, and build appropriate mental models where they are lacking (de Bruin & Bostrom, 2013). For example, recent research suggests that mental models and beliefs about the stability of the climate system and scientific consensus regarding climate change can work to dampen public support for ameliorative action (Cutler, Leiserowitz, & Rosenthal, 2017; Lewandowsky, Gignac, & Vaughan, 2013). Similarly, earlier work by Sterman and Sweeney (2007) showed how individuals' faulty reasoning about stock-and-flow systems, such as the climate system, can lead to preferences for a problematic wait-and-see approach to dealing with the problem. Together these findings suggest that communications efforts aimed at correcting such foundational beliefs and understandings of the climate system (e.g., "consensus messaging"; for a recent review

see Cook, in press) could enhance certain audiences' motivation to take ameliorative action sooner rather than later (e.g., Lewandowsky et al., 2013). However, caution is warranted in using such messaging approaches, as recent work suggests that such messages may actually reinforce political polarization amongst highly knowledgeable individuals by increasing skepticism amongst highly educated conservatives (Cook & Lewandowsky, 2016), even as they increase positive engagement amongst liberals.

3.3.3 Insight 3: Confront false information, do not reinforce it

The prevalence and persistence of climate change myths and misinformation, such as the incorrect belief that there is a *lack* of scientific consensus, is problematic because such misinformation can interfere with the communication of accurate scientific information. In contrast to pure ignorance or knowledge deficits, the consequences of audiences relying on such engrained misinformation are even more troublesome because these beliefs are often held strongly (Leiserowitz, Maibach, Roser-Renouf, & Hmielowski, 2011) and may contribute to faulty decision-making that runs counter to society's and individuals' best interests. Thus, finding ways to neutralize misinformation is necessary; however, retracting myths or misinformation that has been embedded in individuals' minds is notoriously difficult. In part, this is due to the cognitive mechanisms that deter individuals from relinquishing steadfast convictions, processing unfamiliar or counter-attitudinal information, and ultimately updating beliefs when new evidence is encountered (for a review, see Lewandowsky, Ecker, Seifert, Schwarz, & Cook, 2012).

Simple retractions generally fail to dislodge false beliefs (e.g., Ecker, Lewandowsky, Swire, & Chang, 2011) and in some instances can even backfire or reinforce them (e.g., see Nyhan & Reifler, 2010; Lewandowsky et al., 2012). For example, our initial perceptions of others continue to affect our judgments of them even when we subsequently learn that the original information we had about them was incorrect (e.g., Ecker, Lewandowsky, Fenton, & Martin, 2014). One reason for this failure includes individuals' proclivity for messages that are consistent with their preexisting beliefs and that generally just "feel right"; thus, inconsistent information tends to be rejected (Schwarz, Sanna, Skurnik, & Yoon, 2007; Winkielman, Huber, Kavanagh, & Schwarz, 2012). Furthermore, rudimentary attempts to extricate misinformation may create gaps in the mental models that people have built and rely on; failing to fill the void may ultimately result in individuals falling back on faulty information (Ecker, Lewandowsky, & Tang, 2010; Lewandowsky et al., 2012).

Fortunately, recent research has identified specific strategies that communicators can use when correcting or debunking false beliefs. Two methods have shown promise: repeating retractions and filling the gaps created by the retracted misinformation with a factual alternative. Using multiple, repeated retractions can alleviate, if not eliminate, the effect of encoded misinformation by strengthening the efficacy of the retraction (Ecker et al., 2011; Lewandowsky et al., 2012). However, the extent of this effect is undermined by the persistence and strength of the initial

misinformation encoding compared to subsequent retractions (Ecker et al., 2011). More promising in reducing the continued influence of misinformation is to fill the gap created by the retraction with a factual alternative (Johnson & Seifert, 1994). For the factual alternative to be successful it must be plausible, accurately account for causation (Seifert, 2002), be simple, sticky (compelling), and memorable (Heath & Heath, 2007), and ideally, both explain the origin and motivation behind the misinformation (Lewandowsky et al., 2012). For example, when debunking common climate myths, such as the *lack* of scientific consensus, communicators should lead with compelling third-party studies demonstrating 97% consensus and then warn about and refute the myth's line of argument (e.g., false signatories of the Oregon Petition; Cook & Lewandowsky, 2011). To avoid unintentional backfire effects, communicators should also seek to affirm rather than attack individuals' identities as well as foster skepticism about misinformation sources and intentions and use simple, brief rebuttals (Lewandowsky et al., 2012).

Even better than working to debunk existing false beliefs and misinformation is protecting people against their formation in the first place. This approach involves providing individuals with preemptive warning messages about why and how misinformation is presented in an effort to better equip people to recognize and dismiss false arguments (Compton, 2013; Lewandowsky et al., 2012). Recent research suggests that such "prebunking," sometimes also referred to as "inoculation," strategies can work to decrease the uptake of false information through a variety of mechanisms, including by decreasing the perceived trustworthiness of such information sources and their motivations (Cook, in press; Lewandowsky et al., 2012). To be most effective, prebunking messages should both explicitly warn individuals of the threat of misinformation as well as explain the techniques used in establishing those arguments (e.g., see Bolsen & Druckman, 2015). In the context of climate change-related misinformation, prebunking strategies have been found to neutralize misinformation when drawing attention to the flaws of the argument and/or pointing to actual scientific consensus (Cook, Lewandowsky, & Ecker, 2017). While empirical investigations into the inoculation effect are ongoing, others have extended these insights into practical interventions, including a video-based Massive Open Online Course (MOOC) titled, *Making Sense of Climate Science Denial* (Cook et al., 2015). However, it remains to be seen whether such techniques actually work in real-world settings, in which individuals are "exposed" to counter-messages continually; similarly, the necessary "dose" of correcting information is currently unknown and potentially quite challenging to "administer" in a competitive media landscape.

3.3.4 Insight 4: Find frames that "fit" audiences' needs

Knowing one's audience also provides the foundation for developing communications strategies and materials (e.g., messages) that "speak to" or leverage an audience's particular needs, values, mental models, etc. Issue "framing" is the most widely used approach to do just that, particularly in the climate change domain. Framing refers to the strategic use of specific words, images, and concepts

(including metaphors) in an effort to increase the salience of certain aspects of an issue or problem and shape how individuals think about it (Druckman, 2001). Moser (2010) writes, "frames construct a problem, provide a perspective from which to interpret it . . . and deeply influence how persuasive we find the information being communicated" (p. 39). Any complex issue, including climate change, can be framed in a multitude of ways. Nisbet (2009) and Nisbet and Mooney (2007) provide an overview of many of the frames most commonly associated with climate change, including morality (e.g., stewardship as obligation), conflict (e.g., fighting a "war" against climate change), and economic development (e.g., "green jobs").

Of particular relevance to framing CCC is the consideration of different aspects of the outcome (e.g., gains versus losses), which highlight the potential negative or positive consequences of inaction or action. Much of the communication on climate change to date has focused on the dire and dangerous implications of inaction, e.g., habitat degradation, sea level rise. Conversely, opponents of climate change and mitigation policies often refer to and highlight the *benefits* of living in a warmer world (Malone, 2009). Building on Kahneman and Tversky's (1979) classic work demonstrating individuals' aversion to losses, researchers have begun to explore how such gain and loss frames operate within the context of climate communication and engagement, in particular when coupled with messages of distance and uncertainty (Morton, Rabinovich, Marshall, & Bretschneider, 2011; Scannell & Gifford, 2013; Spence & Pidgeon, 2010). These studies tend to suggest that positive, localizing frames are more likely to support and build motivation to take action, although these effects are moderated by a number of other factors (e.g., discussion of uncertainty, audience characteristics).

A large body of research has emerged over the past decade that explores how issue framing and audience-message "fit" work to either support or inhibit productive issue engagement amongst various subgroups and audiences (see Bolsen & Shapiro, in press for a recent in-depth review). Highly influential work by Kahan et al. (e.g., Bliuc et al., 2015; Kahan et al., 2007a,b, 2012; Kahan, 2013) reveals that individuals' core values and social identities powerfully shape how information about climate change is interpreted and either accepted or rejected as valid. This is particularly true with respect to political identity, which has repeatedly been shown to moderate the effects of various climate change frames and engagement with the issue (e.g., Hart & Nisbet, 2012; McCright, Charters, Dentzman, & Dietz, 2016; Unsworth & Fielding, 2014). For example, Hart and Nisbet (2012) found that a message about the health impacts of climate change *increased* political polarization amongst their study participants when the victims of climate impacts were framed as socially distant (e.g., from another country), specifically by causing a boomerang effect among Republicans. On the other hand, studies such as the Bain et al. (2012) work discussed above highlight more productive ways of framing proclimate action, e.g., as supportive of economic and technological development, particularly when engaging with conservative audiences. For communicators, the critical takeaway is the need to identify possible frames for particular audiences and then test them thoroughly before wider dissemination.

3.3.5 Insight 5: Highlight solutions

Much of the existing work on framing, mental models, and risk communication more broadly (e.g., Witte & Allen, 2000) suggests that effective CCC *requires* a focus on solutions rather than solely highlighting impacts and causes (e.g., CRED & ecoAmerica, 2014). Although this makes intuitive sense, the vast majority of existing climate communication does just the opposite, highlighting the anthropogenic causes of the problem as well as the multitude of diverse and depressing anticipated impacts of unmitigated and continued climate change without a clear focus on what can be done to remedy the situation (see Hart & Feldman, 2014). The problem is that such negative, risk-oriented messaging, while likely aligning well with the motives and concerns of many climate communicators, tends to increase the salience of the issue at the cost of depressing individuals' feelings of efficacy and motivation to take action (e.g., Chapman et al., 2016; O'Neill et al., 2013). Moreover, and more importantly, such impacts-focused messaging leads many individuals and audiences to simply turn off from the issue, if not spiral into unproductive denial or feelings of hopelessness (Feinberg & Willer, 2011; Hulme, 2009). Such problematic messaging is perpetuated by the popular press and media (Painter, 2013), which inconsistently convey threat and efficacy messages while framing climate change impacts and actions (Hart & Feldman, 2014).

In contrast, when communicators highlight solutions, particularly those that align with peoples' values, worldviews, and preferred approaches to dealing with societal issues (see Kahan et al., 2007a,b), audiences are able to envision a positive and desirable future world and remain engaged with the issue. In turn, this can provide a concrete goal for individuals and communities to work toward, building both motivation to take action on the issue *and* a sense of personal and collective efficacy (Lee & Aaker, 2004; Roser-Renouf, Maibach, Leiserowitz, & Zhao, 2014; Witte, 1992).

Moreover, solutions-focused messages and outreach strategies allow individuals to worry about the issue in ways that promote rather than inhibit engagement and, often, to identify cobenefits of taking action sooner rather than later (e.g., improving air quality and public health), further building motivation to engage (Bain et al., 2016; Myers et al., 2012). Indeed, practitioners and communicators alike are engaging in meaningful efforts to generate detailed, coherent visualizations of future climate scenarios embedded with planning solutions at the local scale to increase both collective capacity as well as mitigative and adaptive policy support (Cohen et al., 2012; Shaw et al., 2009; Sheppard, 2012). This is an important and ripe area for future research, as it remains largely unknown exactly which combinations of concern-evoking, impacts-focused messages, and hope-inspiring, positive visions of the future are likely to be most effective.

3.3.6 Insight 6: Tell stories

Tailoring and framing messages and outreach efforts to match the needs, values, and existing beliefs of particular audiences is critically important (Bostrom et al.,

2013) but likely not sufficient to produce engaging, effective pieces of communication. As professional storytellers and masterful communicators know well (oftentimes intuitively), communication efforts are most effective when they *tell engaging stories*. But what constitutes a "story" and how does this look differently than what climate communicators are already doing? After all, many climate change advocates and communicators may feel as if they already are engaged in developing and telling stories.

Bringing together much of the work cited above with scholarship on narrative form and storytelling, Jones and Peterson (in press) suggest five strategies for telling effective stories about climate change. The first is both obvious and yet often overlooked by many climate communicators: use well-known narrative forms (e.g., quest, realistic fiction) and components (characters, plot, setting, conflict) to put communication efforts into story form as opposed to more commonly used forms such as press releases and fact sheets. Second, the specific components of the story, e.g., the problem that needs to be overcome and the context within which characters are acting, should be tailored to match audiences so that the overarching issue becomes more personally relevant and relatable. Third, the characters of the story (e.g., heroes, villains, victims, bystanders) also need to be relatable for audiences; this likely means developing different characters for different audiences. For example, farmers are more likely to be engaged by a story that involves other farmers acting as heroes to solve a problem versus one in which the hero is someone unknown or even disliked. Fourth, stories have a temporal component that causally links characters, plot, and setting and highlights people making progress toward overcoming a risk or challenge. Finally, and closely tied to Insight 5 (*Highlight Solutions*), climate change stories should have a clear point or takeaway linked to possible policy (or other) solutions to the challenge. Many of these suggestions can be seen at work in recent, high production-value climate communication efforts (e.g., Showtime's *Years of Living Dangerously*; Leonardo DiCaprio's *Before the Flood*).

3.3.7 Insight 7: Leverage the right messengers and communications channels

Finally, even the most perfectly framed, audience-tailored message or campaign has little chance of succeeding in engaging people when it (1) does not reach the intended audience and/or (2) is delivered by the wrong messenger. Put another way, effective engagement requires identifying and recruiting trusted messengers (i.e., "in-group" members) and communicating with audiences through the information channels they most often use. Of course, these are not always easy things to do, particularly when the aim is to communicate with disengaged or antagonistic audiences. For example, many outreach efforts rely on recruiting celebrities to serve as spokespersons (e.g., Showtime's *Years of Living Dangerously*; see also Anderson, 2011) and the use of social media and other web-based platforms to disseminate campaigns and messages. Although these approaches may work with certain groups

(e.g., highly alarmed Millennials), they are less likely to work with other demographic groups and audiences (e.g., older adults, disengaged audiences); in general, it remains largely unknown, due to a lack of extant research, to what extent celebrities can be successfully used as effective messengers in the context of climate change. In contrast, ongoing efforts by Maibach and colleagues to recruit and train broadcast news meteorologists to integrate climate change-relevant information into the nightly newscast is an example of the type of approach that holds the potential to reach audiences who might otherwise not have much exposure to the issue (Placky et al., 2016; Zhao et al., 2014), both because these individuals have frequent, repeated access to their audiences and because they tend to be highly trusted.

Extant work across a number of disciplines further reinforces the importance of carefully selecting and cultivating messengers who are already trusted by target audiences (Corner et al., 2015; Kahan et al., 2007a,b; Nisbet & Kotcher, 2009), and a number of organizations have begun attempting to put these recommendations into practice (e.g., republicEn, MomentUs, Interfaith Power, & Light). These efforts are particularly important for engaging audiences unlikely to be reached by traditional approaches or whose defense mechanisms may be activated whenever they encounter campaigns or messaging developed and disseminated by mainstream environmental advocacy organizations.

3.4 Moving forward: New approaches and future directions

Although it can be frustrating for issue advocates to hear it, perhaps the clearest takeaway from the existing research is that effective climate communication and engagement requires communicators to truly "get to know" their intended audiences when developing materials and campaigns. Despite rapid growth of research on issue framing and climate change, for example, it remains unclear whether there are certain frames (e.g., public health, responsible management of resources, protection of future generations) that consistently improve public engagement with the issue, particularly when looking across audiences (Bolsen & Shapiro, in press). In part, this may be due to the fact that the broader communication and cultural environment into which climate communication efforts are being injected is constantly changing (witness, for example, the political turmoil across the globe in 2016 and 2017), which in turn affects how particular pieces of communication (e.g., a campaign, a documentary) are interpreted. Put another way, effective communication is conditional on both the audience and the broader context within which communication efforts take place, thus reinforcing the need to test how particular ways of talking about the issue may be interpreted and either used or ignored by audiences at a given point in time.

Indeed, despite the significant growth of CCC research in recent years (and its spreading dissemination among many issue advocates, policymakers, journalists, and others), it is clear that communicators continue to face significant challenges in

effectively engaging diverse and oftentimes antagonistic, or simply apathetic, audiences with this issue. Moreover, many of the suggestions that come from the existing research base, e.g., tailoring, pilot testing messages, recruiting trusted in-group messengers, are difficult to put into place, particularly for organizations or individuals with limited budgets, capacity, time, and relevant expertise. Tailoring communication strategies to audiences' needs is particularly challenging, for a variety of reasons (Bostrom et al., 2013). One involves the problem of "cross-contamination": communication efforts intended to reach one particular audience are likely to be seen by others, potentially hindering the effectiveness of such tailoring efforts. Another is the practical cost involved in "getting to know" each audience well enough to craft effective messages, which may require conducting audience-specific precampaign research. And of course there is the challenge of being able to identify and accurately target the audience(s) to which any given individual belongs (Hine et al., in press).

3.4.1 A need for continued experimentation

All these challenges, particularly those related to audience tailoring, highlight the critical need for communicators and issue advocates to continue experimenting with techniques and approaches that may be able to engage multiple, diverse audiences simultaneously. The recommendation to use the tools and strategies of effective storytelling and careful choice of narrative form is one such approach (Jones & Peterson, in press). Another promising approach may involve the use of various social psychological tools to extend people's mental timelines, either to "bring the future into the present" or else to extend the present into the future, thus decreasing people's tendency to discount the future costs and benefits of today's (in)action on climate change. Indeed, recent work suggests that a variety of interventions, e.g., having people think about their own legacies (e.g., Zaval, Markowitz, & Weber, 2015), reminding them that the person they are now is the person they will be in the future (e.g., Hershfield, Cohen, & Thomson, 2012; Bartels & Urminsky, 2011), asking people to write letters to future others (Shrum, n.d.), can successfully engage diverse audiences in thinking and behaving more productively about the future. Critically, such approaches appear to increase engagement without worsening polarization along political or other cultural divides, although much more work is needed to determine the conditions under which such approaches will and will not be successful at supporting productive engagement with climate change (Vandenbergh & Raimi, 2015; Zaval et al., 2015).

Shifting climate communication from a traditional top-down approach—one in which an organization or individual develops all information to be communicated in advance of engaging with an audience—to a more bidirectional and needs-oriented model may also hold considerable promise moving forward (Brulle, 2010; Ockwell et al., 2009). Such approaches can take many different forms and are already being used in various settings. For example, the Citizens' Climate Lobby trains citizens to engage with (i.e., talk to) a variety of stakeholders and audiences, including other individuals in their local communities as well as

elected officials and representatives. Taking a different approach, leaders of the ongoing Southeast Florida Regional Climate Change Compact have developed a model of highly involved community engagement and public participation that, specifically because of the process it sets out, has allowed diverse perspectives to coexist and overcome potential roadblocks. In large part, this has been accomplished by focusing on addressing the decision-making needs of all involved parties rather than focusing on "converting" people into "believers"; as a result, the focus for participants in the Compact has been on using the best available evidence (i.e., science) to make locally relevant and highly impactful decisions (Kahan, 2015), just as issue advocates hope will happen at all scales of action on climate change.

As past work has revealed, most people report that everyday conversations with trusted family, friends, coworkers, and acquaintances are highly influential in shaping their beliefs about and engagement with climate change. At the same time, people report engaging in few of these conversations in the course of their daily lives (e.g., Leiserowitz et al., 2017; Maibach, Leiserowitz, Rosenthal, Roser-Renouf, & Cutler, 2016). Together these findings suggest that there are potentially large gains to be made in improving outreach and issue engagement if advocates and communicators can develop "soft approaches" that increase the likelihood and civility of such interactions. One possible direction for future research and experimentation in this vein may be to explore different methods for intervening in existing social networks, both face-to-face and internet-based, in an effort to increase the salience of the issue and the frequency with which it comes up as a topic of discussion. This may be particularly powerful if done in ways that leverage existing network leaders to help promote such informal sharing of information about the issue with others (e.g., Hopper & Nielsen, 1991; Nisbet & Kotcher, 2009; Shapiro & Park, 2017; Chapter 4: Social construction of scientifically grounded climate change discussions).

In support of these and other novel approaches, social scientists have a critical role to play by pushing research in new directions. For example, little extant research has examined the key leverage points that communicators might be able to use to increase the incidence of everyday climate change conversations between nonexperts. These may include motivational, social, dispositional, and other factors that psychologists in particular are well-versed in studying in other contexts (e.g., Geiger & Swim, 2016). What may be required is simply a shift in researchers' conceptualization of climate-relevant behavior to also include the many forms of interpersonal communication that could be influential in shaping public engagement with the issue, e.g., talking with friends; signaling interest and concern implicitly and explicitly. Similarly, researchers can repurpose many of the existing paradigms in the literature to identify more and less effective ways of actually encouraging such communications behaviors amongst different groups and audiences. This will entail less of a focus on the *content* of messages and information being conveyed by people to one another and more of a focus on the *drivers* of such behaviors, though of course both could be studied simultaneously (e.g., Geiger & Swim, 2016; Geiger, Swim, & Fraser, 2017; Maki & Raimi, 2017; Swim, Fraser, & Geiger, 2014).

3.4.2 A need for evaluation and new partnerships

As the types and forms of CCC continue to expand, there is also a need for more evaluation-oriented work to be done by researchers. For example, the rapid growth in climate change-related public art installations both in the United States and abroad (e.g., *High Tide*, www.rosekennedygreenway.org/public-art/past-exhibitions/hightide/) represents a perfect opportunity for social scientists to partner with artists, public planners, and humanities scholars to examine how such informal pieces of climate communication influence audiences (see also Guy, Henshaw, & Heidrich, 2015; Nurmis, 2016). Such work could and should also identify how different forms of such public communication efforts differentially influence several audiences and various types of issue engagement (e.g., concern, efficacy, salience, apathy, decision-making). Similar assessment efforts are sorely needed (and beginning to emerge, e.g., Karlin & Johnson, 2011; Sakellari, 2015) with respect to the evergrowing number of documentary and feature films that either focus on climate change explicitly or else contain storylines and/or references to climate-relevant phenomena, e.g., extreme events, future climatic conditions.

3.4.3 Overcoming and avoiding polarization are key

Perhaps most critically, future research on and practice of CCC must find ways to effectively communicate the issue in ways that avoid further polarizing the issue; as Kahan (2015) has put it, communication and engagement strategies need to find ways to "disentangle" climate change knowledge and decision-making from antagonistic cultural commitments and identities if they are to be useful in terms of supporting productive collective action on this issue. Of course, doing so will be challenging given how tightly attitudes toward climate change have become enmeshed in cultural and societal conflicts as well as in the face of continued intentional efforts by vested interests to maintain such polarization (McCright & Dunlap, 2011; Oreskes & Conway, 2011). Moreover, vigilance in the form of continued research and ever-improving methods is required to ensure that communications recommendations are truly supported by rigorous evidence and that they are changed (and well communicated!) when new evidence emerges, e.g., regarding asymmetrical effects of consensus messaging on different audiences (Bolsen & Shapiro, in press). That being said, emerging and innovative efforts make us hopeful that such depolarizing and truly effective approaches to CCC are indeed possible.

3.5 Concluding thoughts

CCC is hard to do well and easy to do poorly. There are many potential pitfalls and relatively few unambiguous and universal recommendations to be found. And yet, clear progress has been made over the past few years toward improved communication and outreach efforts. This progress is, in some part, thanks to the ongoing efforts of researchers across the social sciences who have begun to carefully

examine what motivates and inhibits public engagement with the issue, how people react to different types of climate change frames and stories, and what forms and modes of communication and outreach are likely to effectively engage diverse audiences. Perhaps most encouraging, though, is the continued diversification and experimentation around CCC that is currently under way. As researchers and communicators continue to push their efforts in new and innovative directions, the potential to truly shift public engagement with and discourse around this issue and to support better individual and collective climate-relevant decisions grows.

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