Global warming: Chinese narratives of the future

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Abstract
Anthropogenic Climate Change (climate change or global warming that is caused by human activity) is considered to be one of the key global concerns moving forward this century. The ongoing flow of communication around an issue can be seen as a co-production of strategic messaging that encompasses the voice of multiple stakeholders who have differing narratives that evolve over time. Individuals, governments, businesses, international agencies, and other organizations see themselves as key stakeholders in these evolving stories, and all are trying to develop their own visions and hopes for the future. This article suggests that many of these voices are engaged in a version of “ecological modernization,” a narrative that attempts to develop a win-win discourse of economic growth in conjunction with environmental sustainability under the premise of “doing well by doing good.” Data are from social media platforms in the Chinese language that are analyzed through topic and narrative analysis.

Keywords
Anthropogenic climate change, futures, narratives, scenarios, stakeholders, storytelling, strategic communication

On the occasion of President Xi’s State Visit to Washington, D.C., the two Presidents reaffirm their shared conviction that climate change is one of the greatest threats facing humanity and that their two countries have a critical role to play in addressing it.

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At the United Nations (UN) Summit on Climate Change in 2009, general agreement was reached that “current emissions trajectories were speeding the world towards worst-case climate outcomes and world leaders warned that complacency was tantamount to ‘a global suicide pact’, yet the summit failed to produce any concrete commitments to resolving the issue” (Potter, 2009, cited in Greenberg, Knight, & Westersund, 2011, p. 66). A mere 4 years later, at the start of 2013, newspapers and broadcasters around the globe displayed the first of many dark pictures of Tiananmen Square to call attention to Beijing’s horrendously polluted air—so crammed with particulates that day looks like night (e.g. Wong, 2013).

By November 2014, the heads of state of the two largest economies on the planet, US President Barack Obama and China’s President Xi Jinping, stood for pictures in Beijing to publicize the historic US–China Joint Announcement on Climate Change (White House, 2015). They each committed to help ensure that the climate conference in Paris of 2015 (the UN Climate Change Conference Paris 2015 COP21•CMP11) would be successful and mark the start of true multilateral climate diplomacy (White House, 2015). Because the United States and China are the two countries with the highest carbon footprints, their commitment is crucial to the success of any multinational efforts to combat the destructive impact of climate change (Berlin, 2015).

In order to combat climate change, the Paris Agreement’s overarching goal is to ensure that the global temperature rise is well below 2°C this century (starting from pre-industrial levels) and to accelerate and communicate every country’s actions and investments in creating a sustainable, low-carbon future. Collectively, the nations of the world need to find new ways to limit the global rise in temperature even more than the current agreements require—ensuring that the rise is actually only 1.5°C (United Nations Framework Convention on Climate Change (UNFCCC), n.d.). The agreement also focuses attention on the need for countries and organizations to mitigate and adapt to ongoing climate change impacts and to support vulnerable countries.

The UN Paris Conference collected “Nationally Determined Contributions” (NDCs), which are commitments that each participating nation/party (195 states, the European Union (EU), plus two observer parties—the Holy See and Palestine) will make to slow the global rise in temperature. Scientists are beginning to assess whether these commitments, in the aggregate, are likely to achieve the goals set up by the Paris Agreement. One concern is that while the UN is trying to create a robust framework for implementation and communication, the current round of NDCs extends only through 2025–2030 depending on the nation. Because the process requires reductions in cumulative emissions over the entire century and beyond, the Paris commitments are just the first phase of a much longer timeline. According to Fawcett et al. (2015), assessing the implications of the Paris Agreement requires investigating “multiple possible emissions pathways beyond 2030” (p. 1168). In addition, Fawcett et al. (2015) argue that because of “uncertainties in the global carbon-cycle and climate-system response,” the contribution of the NDCs to global temperature change during the 21st century should be assessed probabilistically using “four global emissions scenarios” that represent different possible future developments, with and without NDCs (p. 1168). Their analysis of the findings from the four most likely scenarios has generated a firestorm of attention from the media and from policy-makers around the world. For example, the Washington Post translates the scientific language in the study for the public and states that “without further emissions reductions, there is ‘virtually no chance’ that global temperatures will stay below the threshold that many scientists say is safe,” and the conclusion is that the world faces a dire future (Warrick, 2015).

Graph 1, provided by Evans-Pritchard (2015) and created by NASA (National Aeronautics and Space Administration—a US Space Agency), is a simple visualization of the CO₂ problem. The rapid growth of our collective “carbon footprint” suggests that the earth’s climate will become more unstable as it warms and the melting icecaps and glaciers will lead to rising sea levels that will submerge islands and coastline buildings and infrastructure (UNFCCC).
Because the consequences are so great, it is important to understand how people respond to environmental communication. The use of scenarios to assess multiple possible alternative futures is a common approach used by policy-makers, scientists, and organizational leaders to examine and account for uncertainties that evolve over time or crises that emerge suddenly (Taleb, 2010). Although there are many data points, algorithms, and models embedded in studies such as Fawcett et al. (2015), future depictions of our planet or “scenarios” are competing stories about possible, usually plausible if not necessarily probable, future situations. The phrase “best-case scenario” or “worst-case scenario” is commonplace in the news around topics such as famines, organizations looking for a path forward among stiff competition, or families facing difficult medical diagnoses. And for many socially significant concerns, such as unrest in the Middle East or climate change, there may be many scenarios competing for the status of the most likely description of the future for a nation or global society. What differentiates scenarios from other types of stories is that they emphasize the causes and effects of the underlying driving forces, trajectories, major trends, or the likelihood of critical events that lead up to a description of the possible futures from the present situation (Bell, 2010).

The technical training needed to analyze and develop data-driven scenarios varies from discipline to discipline, but it often revolves around forecasting methodologies and a keen understanding of their limitations—since all forecasting is flawed. Trends like the growth of American dominance in the automobile industry die out, disruptions in information technology can shake a telephone industry that grew on land lines, or the desire to create crops that withstand disease can be challenged by society’s worries about genetically modified foods. To help policy-makers, organizational members and concerned individuals deal with all these global and local scenarios we must improve foresight.

Foresight is a field that includes multiple perspectives, quantitative and qualitative, designed to help decision-makers and stakeholders in organizations and communities imagine, contemplate, and deliberate about possible strategies, actions, challenges, and opportunities of different plausible futures over the long term (years or decades ahead), as well as better understand the drivers of change, evolving trends, key events, and historical contexts that help generate those
futures (Hines & Bishop, 2006; Loveridge, 2009; Millett, 2011). Foresight concepts could be particularly important to the field of environmental communication and to research on climate change communication.

In the United States, the environmental movement took off in the 1960s, propelled by Rachael Carson’s seminal book *Silent Spring* (1962) which essentially argued that humankind’s blind faith in technology and its unintended consequences were going to kill the world. The book’s most famous chapter was titled “A Fable for Tomorrow,” and it told the story of an unnamed town where all life had died because DDT (dichlorodiphenyltrichloroethane) had entered and destroyed the food chain. The media pushed this scenario and helped the environmental social movement create a public outcry that led to the creation of the Environment Protection Agency and the banning of DDT’s use in agriculture in the United States in 1972 (Lear, 2009). Despite an active environmental movement in the United States and elsewhere, other economic, political, and technologically driven problems, particularly global warming/climate change, were rapidly growing out of control. Much of the early research in environmental communication sought to understand human motivations, resistance to current knowledge, and public perceptions about issues like global warming. While the scientific consensus is that anthropogenic climate change (climate change caused by human activity) is considered an impending global crisis (BBC, 2010; Boykoff, 2007; Budescu, Broomell, & Por, 2009), the discourse of climate change is fraught with conflict.

One line of research has focused on why scientists have had so little impact in changing the master narrative, and how news reports present arguments from a variety of positions yet have failed to produce a coherent narrative. The research blames conflicting scientific results, general uncertainty, the complexity of the information, a variety of personal values, psychological distance, and a political economy based on technology-driven capitalism for the failure of scientists to move public opinion and create support for future policy actions (Corbett & Durfee, 2004; Corner, Butler, & Pidgeon, 2009; Corner & Hahn, 2009).

Other studies have examined narratives in an attempt to understand people’s adherence to a variety of stories about climate change and the difficulty of passing legislation to improve sustainability given that vast sets of data indicate rising sea levels, changing climate patterns, and the impact of large carbon footprints. Hulme (2009) explains that scientists tell a story of “climate change” that has physical attributes related to changing weather patterns, yet there is also a socio-cultural manifestation rooted in neoliberal thinking around free-market ideologies and corporate growth that has enabled many competing narratives to emerge about the meaning of climate change and the likely future consequences (Roper, 201).

There has been little research on climate change communication in China, but there is a growing body of environmentally focused studies (e.g. Wang, 2005; Yang & Calhoun, 2007; Zhang & Barr, 2013). After China catapulted to the rank of the world’s largest producer of greenhouse gas—over 20% in 2009—serious discussions and debates about possible ways forward became more public (Li, 2009). Due to its explosive economic growth, the consumer-oriented market economy (socialist market economy with Chinese characteristics) and China’s status as “factory to the world” were seen as in conflict with concern for the environment (Chen, 2014). Similar to the trajectory of the narratives that emerged in the United States in the 1990s, many people argued that the problems were temporary and that corporations using new technologies could solve them (Chen, 2014). The difficulties with this reasoning are many, but the most prominent are, first, environmental mitigation (e.g. factory retrofitting) can be costly and slow, while the rationality of corporations is to maximize profits by minimizing costs. Second, corporations typically engage in “contempocentric tendencies,” which is the bias of preferring the present to the future (Foster, Clark, & York, 2010).
Environmental campaigns in China are often discussed in the mainstream media because the central government wants the public to acknowledge its new environmental rules and regulations. Yang and Calhoun (2007) considered China’s emerging green public sphere and argue that environmental discourse in China has the following basic elements: “an environmental discourse or greenspeak; publics that produce or consume greenspeak; and media used for producing and circulating greenspeak” (p. 214). They conclude that the rapid growth of environmental non-governmental organizations (ENGOs) was consistent with the quickly multiplying concerns about China’s environmental problems. Zhang and Barr (2013) interviewed numerous members and leaders of Chinese ENGOs and described an activist movement that has impacted the formation of environmental policies in Mainland China.

Chinese greenspeak includes recent neologisms in language like sustainable consumption, endangered species, global warming, desertification, deforestation, biodiversity, and climate change. Greenspeak, however, needs to be contextualized as it can refer to three dominant narratives: (1) a new way of living that is environmentally sensitive (e.g. bringing reusable bags to the store), (2) to invoke the underlying tension between environmental activist and corporatist concerns, and (3) to gloss over problems with superficial changes (often called greenwashing; Yang & Calhoun, 2007). Greenspeak is circulated through the news media, alternative media (CDs, newsletters, etc.), and the Internet.

**Storytelling and narrative engagement**

Fisher (1984) describes human beings as *homo narrans*—storytelling animals. He posits that telling stories has been the most efficient, powerful, and memorable way of learning about the world and constructing human understanding as man has evolved. Throughout the narrative process, experience and understanding are accumulated and culture develops within storytelling communities. Fisher (1985) called his theory the narrative paradigm and argued it allowed researchers to investigate how stories are understood. Do stories sound true and probable to the listener? And are they coherent, do they hang together so that the story appears reasonable? (Hollihan & Riley, 1987).

Storytelling is thus not just a way of exploring how people come to understand the world but also a way to create narratives that guide the future action (Gray, Young, & Blomfield, 2015). Little and Froggett (2009) argue that narratives are often used in strategic communication to create a sense of public issues as an “inclusionary form of intervention” (p. 458). Storytelling is thus a future-oriented meaning construction process, which reciprocally constitutes sense-making by reproducing existing symbolic meanings as well as challenging existing discourse and inserting new language and ideas such as greenspeak. Neologisms like greenspeak and overarching metaphors like the documentary “Under the Dome” (Sun, 2015) are compelling to listeners. Stories usually follow a particular structure (often linear) and characters are placed in specific contexts to create dramatic tension, emotions, and demonstrate cause/effect relationships between events that are happening in a certain order of time and space and project into the future (Fisher, 1984; Riley, Thomas, Weintraub, Noyes, & Dixon, 2015; Zipes, 2012).

Zipes (2006) explains that storytellers try to construct their stories, and themselves, to be relevant both to attract listeners’ attention and to remain in listeners’ minds and later be retold, transformed, and in the future evolve in ways that contribute to reforming a culture. Thus, narratives, as one way of understanding strategic communication design, are now being explored for their role in the construction of global environmental issues. For example, although science communication is supposed to require neutrality and objectivity (Dahlstrom, 2014), Benford and Snow (2000) argue
that the process of telling stories can “assign meaning to and interpret relevant events and conditions in ways that are intended to mobilize potential adherents and constituents, to garner bystander support, and to demobilize antagonists” (p. 614). Although they may not always provide “clear, concise, and coherent” messages, the power of narratives comes “from their illusiveness, indeed, their ambiguity” (Polletta, 2008, p. 33). In other words, the inherent ambiguity of storytelling offers the audience an occasion to connect their personal experiences to the issue at hand. Thus, storytelling might be more efficient in explaining environmental phenomena by “providing a possible remedy for the problems of communicating a meaningful sense of distant science topics” (Dahlstrom, 2014, p. 13618). Frank (2010) suggests that “stories work with people, for people, and always stories work on people, affecting what people are able to see as real, as possible, and as worth doing or best avoided” (p. 3).

Recent research suggests that stories are more engaging than traditional scientific communication, especially for non-expert audiences (Green, 2006; Murphy, Frank, Chatterjee, & Baezconde-Garbanati, 2013). Still other studies found that individuals respond to narratives more efficiently than informative texts on recall, memorization, and comprehension (Graesser, Olde, & Klettke, 2002; Graesser & Ottati, 1995; Zabrucký & Moore, 1999).

To further understand the effectiveness of stories, scholars have analyzed audience narrative engagement (e.g. Busselle & Bilandzic, 2009; Green, Brock, & Kaufman, 2004; Riley, Thainiyom, Murphy, & Latonero, 2014; Slater, Rouner, & Long, 2006). The theories of transportation (being so engaged that the person is “transported” into the story; Green & Brock, 2000, 2002; Murphy, Frank, Moran, & Patnoe-Woodley, 2011), identification (Cohen, 2001), presence (Lee, 2004), and flow (Sherry, 2004) provide different insights into stakeholder experiences with narrative persuasion. Hoffman (2012) suggested that scientists trying to understand the ineffectiveness of much environmental communication have too often ignored the “cognitive miser” effect—this perspective states that people who are not experts at analyzing complex information have “bounded rationality”—in other words they do not fully investigate every issue that faces them. He argues that

People everywhere employ ideological filters that reflect their identity, worldview, and belief systems. These filters are strongly influenced by group values, and we generally endorse the position that most directly reinforces the connection we have with others in our referent group—what Yale Law School professor Dan Kahan refers to as “cultural cognition.”

Kahan’s (2014) research suggests that the problem of communicating climate science is not really about bounded rationality effects. His data indicate that instead people give the most weight to evidence and arguments that support their current opinions, and rather than being cognitive misers, they actually spend a great deal of cognitive time and energy refuting views contrary to their beliefs and create entire systems of evidence and reasoning that support their cultural identity. Kahan (2015) argues that the problem in achieving consensus on the science of climate change communication in much of the West is that it became entangled with politics and thus was no longer amenable to broad strategic communication campaigns that focus on pre-determined messaging (his description of strategic communication is different than the use in this research and is more reminiscent of an advertising campaign than a stakeholder focused campaign). Kahan (2015) describes campaigns that proclaim 97% of climate change scientists agree that climate change is man-made, and he argues that this message essentially tells people they are idiots if they do not agree. His research suggests that instead of making proclamations about culturally polarizing issues, scientists have to engage in the process of strategic communication to help plan for the future impacts from climate change.
Cox (2010) is similarly focused on how to best develop nuanced messages in environmental campaigns. He emphasized the strategic alignment of mobilization messages and activities designed to achieve particular ends (Cox, 2010) and argued that campaigns that seek to change the public should use the strategic communication processes (e.g. Salmon & Christensen, 2003).

Strategic climate change communication tends to take two forms: stories or messages that are designed to influence policy or system level behavior versus those that intend to change individuals’ mindsets or behaviors, such as school activities that teach children to turn off lights when they leave the room. Thus, examining “public will” campaigns investigates how agenda building, framing, social marketing, and so on are organized to produce a series of wider effects (Cox, 2010, p. 124).

Strategic communication campaigns can involve many sorts of actors. Cox (2010) cited the Sierra Club campaign that began in 2007 called “Beyond Coal,” which focused on reducing the number of newly permitted coal-powered plants. Because of the significant regulatory and capital requirements needed to bring a new plant online, there were a number of key sites for protests by members, which delayed permitting and made the plants increasingly expensive. Because the regulatory system involved the federal, state, and local governments, there were many opportunities for lobbying, particularly for renewable fuels. The campaign was said to be successful because many permits had been denied or abandoned.

Analyses of Beyond Coal and other environmental campaigns produced the concept of “ecological modernisation” (Hajer, 1995), which attempts to develop a win-win discourse of economic growth in conjunction with environmental sustainability under the premise of “doing well by doing good.” Roper (2012) refers to this narrative as the “business case” (p. 72) for sustainability. This approach is both directional and aspirational as it guides actions that fit within the larger sustainability story so that organizational actors can determine how to run their businesses so that economic growth is achieved without harming its stakeholders (employees or consumers) and treating the environment well through the use of renewable energy, recycling, and giving back. This shift in behavior is, of course, not easy for many organizations. In an analysis of New Zealand’s discursive operationalization of this “third way” approach (Giddens, 1998) to national sustainability, Roper (2011) found that the country’s long-term appeal to “the good life” is currently underperforming as a sustainable plan of action and New Zealand is not even a developing country.

Strategic communication and new media

Strategic communication campaigns have become very metrics driven and ROI (Return on Investment) focused over the last two decades, yet often they are not successful. Although they have a definite functional component, many researchers believe that a deeper understanding of the way these strategic campaigns structure communication activities through narratives is important (e.g. Cozier & Witmer, 2001). From this perspective, the ongoing flow of communication around an issue can be seen as a co-production of an organization’s strategic messaging along with the voice of stakeholders (and not all working in the same direction!) and others who engage with the narratives as they evolve (Riley et al., 2015). Strategic communication scholars have investigated issue management campaigns, for example, that have been taken up by both sides of the climate debate in order to explore the role of narratives in changing public opinion around environmental issues such as climate change (Greenberg et al., 2011). Such cases are part of a growing number of studies examining the role of corporations and government organizations—and especially the roles of managers and communication practitioners—as scholars theorize new approaches to the environmental problems on our planet (Wittneben, Okereke, Banerjee, & Levy, 2012). The reason is simple: “When the stakes are high, discourse construction becomes a strategic exercise, often involving communication professionals” (Roper, 2011, p. 73).
Complex issues, besides being a challenge to communicate, generally do not lend themselves to short-term solutions. And while this might seem obvious, most organizations in the global landscape are notoriously short-term in their actions. “Long-term thinking and planning necessitate an entirely different organizational paradigm” (Kent, 2011, p. 552). Critical to long-term planning is organizational foresight. Bezold (2010) has argued, “strategic foresight requires a longer and broader view of the environment … and a conscious attention to the organization’s vision and visionary scenarios in the environment” (p. 1513).

Communication campaigns currently operate in an environment where communication tools and narratives are layered upon each other (e.g. Jenkins’ (2006) notion of the Convergence Culture) and notions of message control become relics of a previous era. While these campaigns are still “dependent upon transmitting messages effectively to their target audiences, while overcoming obstacles such as the four rings of defense (selective exposure, selective attention, selective perception, and selective retention),” they must also understand that the more viral and democratic nature of social media require new rubrics for analysis (Capozzi & Zipfel, 2012, pp. 339-341).

Although the Chinese government has a great deal of influence over the dissemination of news through the Xinhua news agency, communication campaigns in China need to follow research recommendations and utilize multiple approaches, channels, and engagement strategies (Greenberg et al., 2011).

Organizations around the world now take for granted that they must use social media. Facebook (2007) announced that within 2 weeks after it opened its registration to organizations, in April of 2006, 4000 organizations had pages on the social networking site. “Wright and Hinson (2008a, 2008b) view social media as an irrefutable benefit to the field of communication due to four key advantages: it’s free, ‘sticky’ (draws people back), efficient, and humanizing” (Capozzi & Zipfel, 2012, p. 338).

Strategic communication campaigns are now focusing on the impact of social media on their ability to achieve their goals. Sundstrom (2012) investigated a social marketing campaign at a non-profit and concluded that social media enabled the cultivation of relationships with stakeholders. Waters, Burnett, Lamm, and Lucas (2009) analyzed the Facebook pages of 275 non-profit organizations for involvement, information dissemination, and disclosure and found that they unfortunately underutilized the platform’s capability.

Twitter is the largest social media platform for organizations, and since 2011, the average number of followers for a corporate Twitter account has almost tripled, from 5076 to 14,709, and Twitter drives many online conversations according to Burson-Marsteller’s (2012) Global Social Media Check-up. There are few studies focusing on the role of social media and climate change; however, a recent study investigated Twitter’s use in climate protests (Segerberg & Bennett, 2011). Among other findings, they discovered that Twitter posts could be used to effectively analyze the changing dynamics of the social media ecology over time.

The Chinese diaspora also uses Twitter in Taiwan, Hong Kong, Singapore, and in countries all over the world. According to the International Financial Times, individuals in Mainland China use virtual private networks to use Twitter, and recently there were more Twitter users in Mainland China than in the United States (Tree, 2012). There are, however, many other social media platforms available in China—of the 21 global platforms with more than 100 million users, at least 7 are in China: QQ, WeChat, QZone, Baidu Tieba, Sina Weibo, Ren-Ren, and YY (Statista.com, 2016). Organizations that want to micro-blog in China have primarily used Weibo, but WeChat and others are now becoming popular. Cai and Yan (2013), for example, observed that People’s Daily uses the Weibo platform to forecast the haze, which is now reported regularly, and to give timely updates regarding the latest policies for solving or, at least, improving the pollution issue.
The challenge for researchers lies in developing new approaches to study social media—the sheer volume and ubiquity have required new data gathering methods and new analytical techniques. The Segerberg and Bennett (2011) study, for example, had over 8000 tweets. One common method analyzes micro-blog data using sentiment analysis. Its goal is to mine opinions (e.g. positive, negative, and neutral) or emotions (e.g. angry, happy, and sad) in massive amounts of social media data because organizations, political campaigns, and social movements all want to know how people feel about them.

In this research project, the first goal is to investigate how organizations in China are constructing the social media components of their strategic communication campaigns in order to help the nation achieve its future climate change goals. Climate change is, however, a global phenomenon and not confined either materially or discursively within the boundaries of one nation; thus, this research project has a second component. Following the qualitative investigation of the social media stories and messages of key organizations in Mainland China (in Chinese on Weibo), the second analysis takes a look at the discourse in English since the announcement by Presidents Xi and Obama states that China and the United States must work together to help meet the UN goals.

**Research questions**

1. What are the broader narratives on social media that involve Chinese and international organizations regarding climate change?
2. Do the strategic communication practices of organizations display foresight, and if so, how?
3. What is the relationship between sentiment and strategic approaches to climate discourse?

**Method**

Little is understood about the ways climate change narratives discursively create alternative futures, although prior research suggests these are important investigations. This project is part of a larger study and focuses on two types of data: Sina Weibo data from December 2015 to March 2016 and Twitter data from December 2015 to March 2016. The methodology is embedded in a narrative approach to organizational social media (Fisher, 1984, 1985) and involves examining the narratives that emerge in the posts. This article uses a subset of data from a study supported by a grant from the Annenberg Foundation to better understand the global nature of these stories. The researchers searched for posts with the Chinese phrase “climate change” (气候变化) from a list of organizations that are significant to the climate reform agenda and used a Twitter feed that searched for the phrase “climate change” and directly imported posts into a content analysis and classification coding software (DiscoverText). The search terms are a shift from our previous work where we searched Chinese Weibo posts only for the phrase “global warming” (全球变暖) as preliminary pilot data at that time indicated that the phrase climate change was actually more about the weather in its most mundane incarnation, President Xi’s most recent statements about China’s involvement in combating global climate change, however, shifted both governmental policy language and subsequently other organizational discourse to the phrase climate change. The coding scheme, however, largely replicates a previous study of organizational posts in English around climate change (Riley, Yan, et al., 2014) to enable further comparisons.

The data from the organizations’ post were hand-coded by trained coders to assess narratives, issues, and sentiment according to the coding scheme below: The training also directed coders to annotate posts for interesting images, videos, or directives.
Content coding and organizational selection

The coding scheme for the content had five categories: (1) Applicability—Is the post appropriate for the study; (2) Area—Is the post describing a local or a global problem; (3) Temporality—Is it about the past, the current timeframe, or the future (or some combination); (4) Strategic purpose of the post/tweet—Is it an information push, an argument/advocacy, a personal story/experience or opinion, or something else; and (5) Valence about climate change and/or its effects—Is it optimistic, pessimistic, or neutral?

The organizations chosen for analysis cover the following categories: News outlets, ENGOs, and governmental NGOs (GNGOs; category added for China), international NGOs (INGOs; for example, the UN), and Corporations. Those selected followed the same process as Riley, Yan, et al. (2014). For example, in the case of NGOs and GNGOs, the top 5 largest were chosen using government statistics published on Baidu. The INGOs chosen were the UN, World Bank, and the Asia Development Bank. Two types of corporations were chosen—the top 10 Chinese corporations by size on the Fortune 500 list and the top 10 by size in areas related to climate change such as energy companies that operate in China. News organization selection deviated from the “top 10 rule” as many of the largest news organizations use feeds from Xinhua, the national news organization. In order to add some diversity, news organizations were chosen in consultation with several former journalists from China to achieve some geographic, professional, and audience age differences so that they are likely to differ in what they publish/make available as well as add local or specific news content (such as Bloomberg-style financial news). The organizations represent traditional news (Xinhua), broadcast (e.g. CCTV), geographic diversity (e.g. Phoenix), business news (e.g. Sohu), Internet (e.g. Sina News), and mobile news, which is popular with younger content consumers (e.g. 163 news).

Training

Three native Chinese speakers trained on practice data from a previous data set until inter-rater reliability was above .80 for all the coding categories. The codebook was modified for clarity as the training period was conducted and the option of “Regional” under “Area” was discarded for this study, utilizing all possible pairs. The inter-rater reliability was calculated using Krippendorff’s alpha. The alpha across the three coders for the entire coding scheme averaged approximately .85.

The second section of this analysis uses a machine coded classification system to look more broadly at climate change data on social media in English. The Twitter data were pulled with the DiscoverText software from the Twitter application programming interface (API), which resulted in more than 2,000,000 tweets (and more than 4,000,000 if “global warming” posts are included). The data were de-duplicated and clustered. The data over time show a gradual but steady decrease in climate-related tweets following the Paris summit (see Graph 2). A number of accounts were eliminated from further analysis after they were determined to be bots (both concerned with climate change and deniers of climate change) using a python API and the Bot-or-Not (2016) interface.

Results from Sina Weibo

RQ1. What are the broader narratives on social media that involve Chinese and international organizations regarding climate change?

The data show that news outlets mainly push out information with little advocacy in terms of how to respond to climate change challenges. The exception is coverage of Earth Hour, the World Wide
Fund for Nature’s (WWF) 1 hour, light’s off, event held every year in March around the world. In this case, new outlets were all promoting the benefits that come from the environmentally focused event. The Paris summit held in December 2015 was the largest single event covered. The overarching narrative is that China is playing a positive role in the global effort to control climate change and the problems that result from it.

A second narrative was about China’s bilateral and multilateral alliances with other countries to achieve the climate change goals. The Paris summit allowed China’s news industry to move away from stories about its own difficulties with respect to climate change and focus on its newfound role as a positive force in the global fight. Both local and national news outlets offered such narratives. In order to display the information in a more entertaining fashion, they sometimes moved away from straight-forward climate science. For example, Phoenix news posted about a Chinese celebrity, actress and singer Zhou Xun, who participated in a public service video production that focused on the global water crisis. The message claimed the crisis was created through overuse of natural resources, pollution, and climate change. She sang a song to express the urgency for everyone to protect water and to conserve. The post suggested the song was aspirational and future oriented—“Travel hand in hand with our dream.”

There is also a strong educational component to the narratives, framing the problems as worldwide and not completely new. One example was a series that explained how scientists are using art to study the climate over time. Several news outlets covered a study where drawings and paintings from the time before cameras were invented were used as valuable resources/data for scientists to analyze climate change. They noted that in 1815 the Tambora volcano erupted, which caused the temperature to drop around the globe. Some painters in Europe documented the sunset scenes of bright red and orange. Scientists hope to analyze these paintings to uncover the main components of atmosphere following the eruption.

As expected, unlike the diversity found in news coverage from prior research conducted in English (Riley, Yan, et al., 2014), the stories were somewhat redundant in this data set as many of the outlets utilize some of the same information for their news material.

**Graph 2.** Time track of climate change tweets December 1–March 31.
The ENGOs and GNGOs/government-organized NGOs (GONGOs) were much more focused than news agencies on advocating for change in their posts. They recommended solar technology, reductions in carbon footprint, and recycling. Compared to the results of the study that was conducted in English, there were no counter-narratives (which were found in English language tweets). Other researchers, however, have noted that climate skepticism exists in China but in a different form: people do not so much challenge the validity of climate science as much as they question the necessity or effectiveness of Western solutions to climate change, believing that concepts like low-carbon emission reduction plans are a US plot against China (Zhang & Barr, 2013). Correcting the public’s incorrect opinions about climate change was, however, clearly seen as part of the ENGO/GNGO’s responsibility. There were also posts about the possibility that the central government’s goals might not be met or that the strategy might have to shift to one of “resilience.” However, there was little in the Chinese language data about engaging with the future compared to the previous study.

One of the overarching narratives is that it is important to educate the public about the history of climate change as well as the historical endeavors made by China to better the global society. They post about global, recent, and historical climate change issues. There is a similar emphasis on China’s global alliances in posts from news outlets. What is different is the negative tone used to describe the role of the United States, which was depicted as a difficult partner as far back as the South Africa Climate Change Summit in 2011.

China, on the other hand, was a good partner—it informed its citizens about climate change and there were several human-interest style stories that highlighted and praised individuals for their efforts at reducing their own carbon footprints. Stories about various Beijing-based environmental agencies collaborating well together to solve problems were also common.

The UN is very active on social media with hundreds of posts. They offered numerous stories about various climate change summits and conferences, but interestingly the posts were primarily focused on who attended the summits and not the specifics of the agreements, as was found in the media posts. The UN also did not offer actual arguments about the importance of China’s involvement. They had a very personality-driven communication strategy that relies on celebrities or government leaders as advocates and allows the UN to be the mediator. These narratives also tended to be very event-driven. There was also, for instance, a lot of coverage of climate change on special dates such as Earth Day. The UN also took advantage of celebrity spokespersons, especially Leonardo DiCaprio (see image below), who would be quoted at events, or would help publicize environmentally significant announcements about the importance of an upcoming summit, or the role nations needed to play to improve the earth’s chances of survival. By utilizing the Chinese words for “you” and “we,” the UN posts also tried to involve the receiver and give the sense of being personally addressed. This is consistent with the research on individual alignment with messages (Riley et al., 2015) and may also be an attempt at parasocial communication to give the sense that the celebrity is communicating with everyone on Weibo (Perse & Rubin, 1989).

Stories that pointed out the inherent conflict between a rapidly growing economy and the need to deal with the impacts of that growth on climate change, however, were typically stated just as facts. There were, however, stories that focused on China’s role at the summit and on its alliance with the United States and how the two countries would act together to reduce global warming, a strategy of jointly constructed ecological modernization. The master narrative of the World Bank was quite different and focused on its own image transformation as well as transforming individuals and communities. While the UN continues to be a leader in the Climate Change Summit and is widely recognized as a key negotiator in the global discourse, the World Bank wanted social media netizens to know that it too plays a significant role in solving climate change, although most people just see it as a financial organization—a lender. Thus, the Bank was also very active in educating
Table 1. Top 3 organizations focused on the future.

| Organization name | Organization type                  | Total number of postings coded | Percentage of postings using future |
|-------------------|------------------------------------|-------------------------------|-----------------------------------|
| United Nations    | Inter-governmental organization    | 265                           | 80.38%                            |
| Greenpeace        | Inter-governmental organization    | 98                            | 80.61%                            |
| Xinhua            | State-owned news agency            | 61                            | 96.72%                            |

the public about climate change—warning everyone that the climate is changing in dangerous ways and that they should notice the negative signs of climate change around them (Table 1).

RQ2. Do the strategic communication practices of organizations display foresight, and if so, how?

The media organizations, starting with Xinhua, are constantly posting about the climate change goals that China must meet in order to save its coastline cities, improve its general environmental conditions, and be a leader in the global climate change effort—goals that stretch out decades. The ENGOs and inter-governmental organizations (IGOs), especially Greenpeace, also offered explicit foresight narratives: for example, several of the ENGOs explained what can be achieved by focusing on new more sustainable energy strategies and gave a date in the future when the actions must be completed. Although their communication strategy had a due date, there was an obvious absence of implementation plans in any of the posts or links—no real advice for individuals, organizations, or communities regarding ways to make these changes happen and no examples of plans that have worked in the past.

Few corporate accounts posted about climate change or the environment—there were only 82 posts combined. In general, most local Chinese companies do not post often on Weibo, let alone post about climate change. For those companies who do post on Weibo, their posts are mainly about their product promotions or it appears that some were answering the call from central government to comment on a particular topic.

Multinational companies, however, did have several posts about climate change, especially the Total Company. The Total (2016) organization, which operates in 130 countries, posted frequently before and during the 2015 Paris Summit. The posts displayed a fair amount of “greenspeak” but also displayed a clear discursive strategy to highlight the company’s goal to reduce their CO₂ emissions and help address the broader climate change cause. Total was one of the rare gas/fuel companies to publicly engage in social media with discussions about climate change. This communication strategy displays an important element of foresight: the global public and environmental group discourse connects fossil fuel industries with reports of coming devastation and a forward-looking vision that shifts away from fossil fuels and the associated pessimistic discourse.

The World Bank’s social media strategy was more foresight-driven than most as it was one of the few organizations that truly sought to make use of Weibo’s social nature by conducting what the strategic communication literature calls an engagement plan—a serious effort to reach out to the public for discussions and to find other ways to excite people about a topic. For example, they used micro-interviews—short individually focused Q&As—to make their posts more interactive instead of just waiting for someone to reply to a post.

RQ3. What is the relationship between sentiment and strategic approaches to climate discourse?
As might be expected from environmentally focused groups, ENGOs and GNGOs often highlighted the plight of animals facing climate change. Narratives from the animals’ perspectives (i.e. polar bears) were especially compelling as they often had images. These narratives were attention-getting and emotionally driven—one of the few instances in all the social media posts where the power of storytelling was utilized, which was surprising as previous research on ENGOs indicated that they were effective at using their narrative skills effectively (Zhang & Barr, 2013).

In general, the data show that (see Table 2) only 35% of the organizations’ posts in the data set post micro-blogs were pessimistic about the future.

| Table 2. Sentiment of Weibo data on climate change. |
|---------------------------------|-----------|-----------|-----------|-----------|
| Number of postings              | Neutral   | Mainly optimistic | Pessimistic | Can’t decide |
| Total number of postings coded  | N = 782   | 61         | 355        | 276        | 2          |

Climate change narratives on Twitter

The Twitter data are primarily from the United States, with the second largest number from the United Kingdom, then Canada and Australia. There are over a thousand tweets from elsewhere in the world, most frequently Europe, and especially Paris, the host of the international climate change conference. The social media discourse is in many ways similar to that in China, primarily due to the fact that it is very leader and celebrity focused. The most widely retweeted post from a real account was from Neil Degrasse Tyson—an American physicist and television star. Leonardo DiCaprio was again one of the most recognized participants in Twitter (third in the top 10 most retweeted), appearing with Secretary General of the UN Ban Ki-Moon and very tightly intertwined with the UN’s messaging. The UN is itself one of the most voluminous communicators in this data set with thousands of tweets from its official departments and from many leaders and members (and some may not have identified as UN employees).

Most of the other accounts in the top 10 are US political figures, Barack Obama, Hillary Clinton, Bernie Sanders, and Ted Cruz, in part because they are focused on the topic of climate change and in part because of the upcoming presidential election. Except for Ted Cruz, the other political figures are using most of the same communication strategies that were seen in the China data. They are creating awareness of the problems by describing a future that is scary and challenging but solvable if the United States shifts to renewable resources and partners with China and other countries on sustainable policies.

Ted Cruz and a site called TCOT (top conservatives on Twitter) along with Fox News are prominent in this space for posting counter-narratives—they are climate change deniers or at least skeptics, which was not seen in the Chinese data. The clusters show that there are three common communication strategies for counter-narratives: (1) republish links to any studies that complicate the story of climate change, for example, the difference in warming rates between land and the seas; (2) ridicule the links between climate change and international and social issues like terrorism or crime (more challenging stories to tell in 140 characters); and (3) ad hominem attacks. The other political figure who is not in the top 10 but in the top 20 is Prime Minister Narendra Modi of India. Modi’s communication strategy is consistent across his posts—India needs to develop sustainable energy and technologies but will not be pressured into carbon agreements that are not in its best interest.
The data were also filtered for the terms “China,” and “Chinese” and “气候变化” (climate change). This produced a corpus of 34,652 tweets after de-duplication. The three largest clusters, taken together, create a complete picture of the climate change debate in the United States—in miniature. The largest cluster with almost 6000 retweets was originally by Donald Trump who posted, “The concept of global warming was created by and for the Chinese in order to make U.S. manufacturing non-competitive.” This was followed by the second largest cluster of over 3000 posts—retweets of Senator Sanders claiming that “The American people will not support a candidate who thinks climate change is a hoax invented by the Chinese.” And in third place with 1360 tweets, actor Mark Ruffalo responds, “Lol does the @realDonaldTrump really think Climate Change is a hoax started by China??? Holy stupid conspiracy theory Batman!” And with that remark, the theater of the absurd campaign being run by Donald Trump is transformed into a bad 1960s television comedy with people in comic book costumes.

Finally, corporations are much more visible in the English data, but energy companies similarly keep a low profile. Well-known CEOs like Tim Cook of Apple, Elon Musk of Tesla, and Bill Gates of the Gates Foundation (formerly Microsoft) are all present in social media, attempting to keep the conversation based in good science and focused on the future.

Discussion and conclusion
Because of the unprecedented rate of China’s economic growth, the simultaneous increase in environmental problems has led to significant challenges. The key to understanding the global political debates around climate change requires understanding China’s ENGOs and their strategic communication across platforms. Zhang and Barr (2013) found innovative mobilization strategies employed by Chinese grassroots activist stakeholders that required them to use better communication skills and narrative building and noted that they are forward-thinking—looking to develop new ways to engage with diverse audiences, mobilize social resources, and compete for political influence. Unfortunately, their social media presence is less developed and their storytelling is less compelling than their historically documented communication styles.

The organizations with the most engaging communication strategies in China were Greenpeace and the World Bank. Having excellent communication strategies are critical to both organizations as China has recently placed restrictions on non-Chinese NGOs operating in China and the World Bank is faced with a future where China is building its own development bank, the Asian Infrastructure Investment Bank (AIIB), which has attracted 57 founding member countries including some of America’s closest allies—the United Kingdom, Germany, France, South Korea, and Israel, among others—while the United States and Japan declined membership (Chakravorti, 2015).

The future of climate change in China is constructed through different mediated experiences than elsewhere in the world. Shapiro (2012) argues that the “salient current drivers of environmental change in China are similar to and yet different from the main drivers of change throughout the world” (p. 34). Our research supports that of Yang and Calhoun (2007), who noted that although the Chinese government plays a role in the discourse on the environment,

the constitution of a Chinese green public sphere depends crucially on citizens and citizen organizations and on their creative use of the Internet, alternative media, and the mass media. We will need to develop a perspective that emphasizes the interpenetration and mutual shaping of state and society. (p. 230)

Strategic use of social media will be critical as the millennial generation, whose members lead their lives online as much as on the ground, needs to create truly socio-material organizations that
can harness the power of narratives to strategically communicate with the vast population of China and beyond.

In the last 2 weeks of December 2015, the Chinese government published two significant reports. The first by the Chinese Academy of Sciences concluded that “the Himalayan glaciers and the Tibetan permafrost are succumbing to catastrophic climate change, threatening the water systems of the Yellow River, the Yangtze and the Mekong” (Evans-Pritchard, 2015). The Tibetan plateau contains the largest reservoir of fresh water outside the Arctic and Antarctica. Because the area is warming at twice the global pace, it is “the epicentre of global climate risk” (Evans-Pritchard, 2015). The second study was published by the science ministry and titled the “Third National Assessment Report on Climate Change.” Evans-Pritchard notes that is the official climate assessment by the Communist Party, and it concludes that

China has already warmed by 0.9-1.5 degrees over the past century—higher than the global average—and may warm by a further five degrees by 2100, with effects that would overwhelm the coastal cities of Shanghai, Tianjin and Guangzhou. The message is that China faces a civilizational threat.

Global warming or climate change—the language debate on the terms pales in comparison with the looming problems—requires the mobilization of organizational will, political will, and social will. Putting strategic communication at the center of policy planning, youth engagement, and social media action in ways that are less about controlling the climate change message and more about organizations creating processes and infrastructures that allow a co-constructed future to develop will help create a communication process that engages “a billion points of light.”

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**References**

BBC. (2010). *BBC climate change poll—February 2010*. Retrieved from [http://news.bbc.co.uk/nol/shared/bsp/hi/pdfs/05_02_10climatechange.pdf](http://news.bbc.co.uk/nol/shared/bsp/hi/pdfs/05_02_10climatechange.pdf)

Bell, W. (2010). *Foundations of futures studies, Vol. 1: Human science for a new era*. New Brunswick, NJ: Transaction Publishers.

Benford, R., & Snow, A. D. (2000). Framing processes and social movements: An overview and assessment. *Annual Review of Sociology, 26*, 611–639.

Berlin, K. (2015, December 1). COP21: A crucial step on the path to ending climate change. *Newsweek*. Retrieved from [http://www.newsweek.com/cop21-crucial-step-path-end-climate-change-399825](http://www.newsweek.com/cop21-crucial-step-path-end-climate-change-399825)

Bezold, C. (2010). Lessons from using scenarios for strategic foresight. *Technological Forecasting & Social Change, 77*, 1513–1518.

Bot-or-Not. (2016). Retrieved from [http://truthy.indiana.edu/botornot/](http://truthy.indiana.edu/botornot/)

Boykoff, M. (2007). Flogging a dead norm? Media coverage of anthropogenic climate change in United States and United Kingdom, 2003-2006. *Area, 39*, 470–481.

Budescu, D. V., Broomell, S., & Por, H. (2009). Improving communication of uncertainty in the reports of the intergovernmental panel on climate change. *Psychological Science, 20*, 299–308.

Burson-Marsteller (2012). *Global social media check-up 2012*. Retrieved from [http://sites.burson-marsteller.com/social/default.aspx](http://sites.burson-marsteller.com/social/default.aspx)
Busselle, R., & Bilandzic, H. (2009). Measuring narrative engagement. *Media Psychology, 12*, 321–347. doi:10.1080/15213260903287259

Cai, W., & Yan, D. (2013). 媒体微博：重塑新闻传播的新起点——以《人民日报》有关雾霾的微博报道为个案的研究与思考 [Media Weibo account: Reconstruct news & communication: A case study on People’s Daily online report about haze issue on Sina Weibo]. *Journalism Review*. Retrieved from http://www.cnki.com.cn/Article/CJFDTotal-XWJZ201303019.htm

Capozzi, L., & Zipfel, L. B. (2012). The conversation age: The opportunity for public relations. *Corporate Communications: An International Journal, 17*, 336–349. 1356-3289. doi:10.1108/13563281211253566

Carson, R. (1962). *Silent spring*. Boston: Houghton Mifflin.

Chakravorti, B. (2015, April 20). China’s new development bank is a wake-up call for Washington. *Harvard Business Review*. Retrieved from https://hbr.org/2015/04/chinas-new-development-bank-is-a-wake-up-call-for-washington

Chen, S. (2014). *Environmental communication with Chinese characteristics: Crises, conflicts and prospects* (Unpublished dissertation). Simon Fraser University, Burnaby, British Columbia, Canada.

Cohen, J. (2001). Defining identification: A theoretical look at the identification of audiences with media characters. *Mass Communication & Society, 4*, 245–264.

Corbett, J. B., & Durfee, J. L. (2004). Testing public (un)certainty of science: Media representations of global warming. *Science Communication, 26*, 129–151.

Corner, A., Butler, C., & Pidgeon, N. (2009). Media communications and public understanding of. *Management Communication Quarterly, 25*, 550–559. doi:10.1177/089331891140988

Corner, A., & Hahn, U. (2009). Evaluating scientific arguments: Evidence, uncertainty & argument strength. *Journal of Experimental Psychology: Applied, 15*, 199–212.

Cox, R. J. (2010). Beyond frames: Recovering the strategic in climate communication. *Environmental Communication, 4*, 122–133.

Cozier, Z., & Witmer, D. (2001). The development of a structuration analysis of new publics in an electronic environment. In R. Heath, & G. Vasquez (Eds.), *Handbook of public relations* (pp. 615–625). Thousand Oaks, CA: SAGE. Retrieved from http://dx.doi.org/10.4135/9781452220727.n55

Dahlstrom, M. F. (2014). Using narratives and storytelling to communicate science with nonexpert audiences. *Proceedings of the National Academy of Sciences of the United States of America, 111*(Suppl. 4), 13614–13620. doi:10.1073/pnas.1320645111

Evans-Pritchard, A. (2015, December 16). Even if the global warming scare were a hoax, we would still need it. *The Telegraph*. Retrieved from http://www.telegraph.co.uk/finance/economics/12052582/Even-if-the-global-warming-scare-were-a-hoax-we-would-still-need-it.html

Facebook. (2007). Facebook Factsheet. Retrieved March 10, 2008 from http://www.facebook.com/press/info.php?factsheet

Fawcett, A. A., Iyer, G. C., Clarke, L. E., Edmonds, J. A., Hultman, N. E., McJeon, H. C., … Shi, W. (2015). Can Paris pledges avert severe climate change? *Science, 350*, 1168–1169.

Fisher, W. (1984). Narration as a human communication paradigm. *Communication Monographs, 51*, 1–22.

Fisher, W. (1985). The narrative paradigm: An elaboration. *Communication Monographs, 52*, 347–367.

Foster, J. B., Clark, B., & York, R. (2010). *An ecological rift: Capitalism’s war on the earth*. New York, NY: Monthly Review Press.

Frank, A. (2010). *Letting stories breathe*. Chicago, IL: University of Chicago Press.

Giddens, A. (1998). The third way: The renewal of social democracy. Cambridge, UK: Polity.

Graesser, A. C., Olde, B., & Klettke, B. (2002). How does the mind construct and represent stories? In M. C. Green, J. J. Strange, & T. C. Brock (Eds.), *Narrative impact: Social and cognitive foundations* (pp. 229–262). Mahwah, NJ: Lawrence Erlbaum.

Graesser, A. C., & Ottati, V. (1995). Why Stories? Some evidence, questions, and challenges. In R. S. Wyer (Ed.), *Knowledge and memory: The real story* (pp. 121–132). Mahwah, NJ: Lawrence Erlbaum.

Gray, B., Young, A., & Blomfield, T. (2015). *Altered Lives*: Assessing the effectiveness of digital storytelling as a form of communication design. *Continuum, 29*, 635–649. doi:10.1080/10304312.2015.1025359
Green, M. C. (2006). Narratives and cancer communication. *Journal of Communication, 56*, S163–S183.

Green, M. C., & Brock, T. C. (2002). In the mind’s eye: Transportation-imagery model of narrative persuasion. In M. C. Green, J. J. Strange, & T. C. Brock (Eds.), *Narrative impact: Social and cognitive foundations* (pp. 315–341). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Green, M. C., & Brock, T. C. (2000). The role of transportation in the persuasiveness of public narratives. *Journal of Personality and Social Psychology, 79*, 701–721.

Green, M. C., Brock, T. C., & Kaufman, G. F. (2004). Understanding media enjoyment: The role of transportation into narrative worlds. *Communication Theory, 14*, 311–327.

Greenberg, J., Knight, G., & Westersund, E. (2011). Spinning climate change: Corporate and NGO public relations strategies in Canada and the United States. *International Communication Gazette, 73*, 65–82. doi:10.1177/1748048510386742

Hajer, M. A. (1995). *The politics of environmental discourse: Ecological modernization and the policy process.* Oxford: Clarendon Press.

Harris, S. (2013). Stanford researchers to open-source models they say has nailed sentiment analysis. Retrieved from http://gigaom.com/2013/10/03/stanford-researchers-to-open-source-model-they-say-has-nailed-sentiment-analysis/

Hines, A., & Bishop, P. J. (Eds.). (2006). *Thinking about the future: Guidelines for strategic foresight.* Washington, DC: Social Technologies.

Hoffman, A. J. (2012, Fall). Climate science as culture war. *Stanford Social Innovation Review*. Retrieved from http://ssir.org/articles/entry/climate_science_as_culture_war

Hollihan, T. A., & Riley, P. (1987). The rhetorical power of a compelling story: A critique of a “Toughlove” parental support group. *Communication Quarterly, 35*, 13–25.

Hulme, M. (2009). *Why we disagree about climate change: Understanding controversy, inaction and opportunity.* Cambridge, UK: Cambridge University Press.

Jenkins, H. (2006). *Convergence culture: Where old and new media collide.* New York: NYU Press.

Kahan, D. M. (2014). Making climate science communication evidence-based—All the way down. In M. Boykoff, & D. Crow (Eds.), *Culture, politics and climate change.* New York, NY: Routledge.

Kahan, D. M. (2015). Climate-science communication and the measurement problem. *Advances in Political Psychology, 36*, 1–43. doi:10.1111/pops.12244

Kent, M. L. (2011). Public relations rhetoric: Criticism, dialogue, and the long now. *Management Communication Quarterly, 25*, 550–559.

Lear, L. (2009). *Rachel Carson: Witness for nature.* New York, NY: Mariner Books.

Lee, K. M. (2004). Presence, explicated. *Communication theory, 14*, 27–50.

Li, M. (2009). Capitalism, climate change and the transition to sustainability: Alternative scenarios for the US, China and the world. *Development and Change, 40*, 1039–1061.

Little, R. M., & Froggatt, L. (2009). Making meaning in muddy waters: Representing complexity through community based storytelling. *Community Development Journal, 45*, 458–473. doi:10.1093/cdj/bsp017

Loveridge, D. (2009). *Foresight: The Art and science of anticipating the future.* NY, NY: Routledge.

Millett, S.M. (2011). Managers as visionaries: A skill that can be learned. *Strategy & Leadership, 39*, 56–58.

Murphy, S. T., Frank, L. B., Chatterjee, J. S., & Baezconde-Garbanati, L. (2013). Narrative versus nonnarrative: The role of identification, transportation, and emotion in reducing health disparities. *Journal of Communication, 63*, 116–137.

Murphy, S. T., Frank, L. B., Moran, M. B., & Patnoe-Woodley, P. (2011). Involved, transported, or emotional? Exploring the determinants of change in knowledge, attitudes, and behavior in entertainment-education. *Journal of Communication, 61*, 407–431. doi:10.1111/j.1460-2466.2011.01554.x

Perse, E. M., & Rubin, R. B. (1989). Attribution in social and parasocial relationships. *Communication Research, 16*, 59–77.

Polletta, F. (2008). Storytelling in social movements. In H. Johnston (Ed.), *Social movements and culture* (pp. 33–53). New York, NY: Routledge.

Potter, M. (2009). Climate change complacency “global suicide pact” UN told. *Toronto Star.* Retrieved from www.thestar.com/news/world/article/699107
Riley, P., Thainiyom, P., Murphy, S., & Latonero, M. (2014). Assessing change in attitudes, awareness, and behavior in Indonesian youths: A multi-method communication and social media approach (Final research report to USAID). Retrieved from http://pdf.usaid.gov/pdf_docs/PA00K8B1.pdf

Riley, P., Thomas, G. F., Weintraub, R., Noyes, A., & Dixon, S. (2015). Good governance and strategic communication: A communication capital approach. In D. Holtzhausen, & A. Zerfass (Eds.), The Routledge handbook of strategic communication (pp. 201–213). New York, NY: Routledge.

Riley, P., Yan, B., Guth, K., Evans, S., Noyes, A., Abe, Y., … Steves, K. (2014, May). Environmental narratives, social media and public relations. Paper presented at ICA, Seattle, WA.

Roper, J. (2012). Environmental risk, sustainability discourses, and public relations. Public Relations Inquiry, 1, 69-87. doi:10.1177/2046147X11422147

Salmon, C., & Christensen, R. E. (2003, June). Mobilizing public will for social change. Communication Consortium Media Center. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.36.4537&rep=rep1&type=pdf

Segerberg, A., & Bennett, W. L. (2011). Social media and the organization of collective action: Using Twitter to explore the ecologies of two climate change protests. The Communication Review, 14, 97–215. doi:10.1080/10714421.2011.597250

Shapiro, J. (2012). China’s environmental challenges. Malden, MA: Polity Press.

Sherry, J. L. (2004). Flow and media enjoyment. Communication Theory, 14, 328–347.

Slater, M. D., Rouner, D., & Long, M. (2006). Television dramas and support for controversial public policies: Effects and mechanisms. Journal of Communication, 56, 235–252.

Statista.com. (2016). Retrieved from http://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/

Sun, Y. (2015). 新媒体视域下公益纪录片的说服模型探讨—以《穹顶之下》为例 [Persuasion model of documentary for public good in the era of new media: A case study on Under the Dome]. News World, p. 11.

Sundstrom, B. (2012). Integrating public relations and social marketing: A case study of planned parenthood. Social Marketing Quarterly, 18, 135–151. doi:10.1177/152450041245048

Taleb, N. N. (2010). The black swan, The impact of the highly improbable, 2nd ed. New York, NY: Random House Trade Paperbacks.

Total. (2016). Total Corporate website. Retrieved from http://www.total.com/en/corporate-profile/innovating-meet-tomorrows-energy-needs

Tree, O. (2012, September 26). Twitter is most popular in China … Where it is blocked. International Business Times. Retrieved from http://www.ibtimes.com/most-twitter-users-chinawhere-its-blocked-795887

United Nations Framework Convention on Climate Change. (n.d.). The Paris agreement. Retrieved from http://bigpicture.unfccc.int/#content-the-paris-agreement

Wang, L. (2005). Lü meiti: Zhongguo huanbao chuanmei yanjiu [Green media: Environmental communication in China]. Beijing, China: Tsinghua University Press.

Warrick, J. (2015, November 27). A successful Paris climate treaty may not be enough to keep temperature rise below 2 degrees Celsius, study warns. Washington Post. Retrieved from https://www.washingtonpost.com/news/energy-environment/wp/2015/11/26/a-successful-climate-treaty-in-paris-may-not-be-enough-to-keep-global-temperatures-from-crossing-the-danger-zone-study-warns/

Waters, R. D., Burnett, E., Lamm, A., & Lucas, J. (2009). How nonprofit organizations are using Facebook. Public Relations Review, 35, 102–106.

White House. (2015, September 25). Retrieved from https://www.whitehouse.gov/the-press-office/2015/09/25/us-china-joint-presidential-statement-climate-change

Wittneben, B. B. F., Okereke, C., Banerjee, S. B., & Levy, D. L. (2012). Climate change and the emergence of new organizational landscapes. Organization Studies, 33, 1431–1450. doi:10.1177/0170840612464612

Wong, E. (2013, January 30). Beijing takes steps to fight pollution as problem worsens. New York Times. Retrieved from http://www.nytimes.com/2013/01/31/world/asia/beijing-takes-emergency-steps-to-fight-smog.html?_r=0
Wright, D. K., & Hinson, M. D. (2008a, April). *Examining the increasing impact of social media on public relations practice*. Gainesville, FL: Institute for Public Relations.

Wright, D. K., & Hinson, M. D. (2008b). How blogs and social media are changing public relations and the way it is practiced. *Public Relations Journal, 2*, 1–21.

Yang, G., & Calhoun, C. (2007). Media, civil society, and the rise of a green public sphere in China. *China Information, 21*, 211–237.

Zabrucky, K. M., & Moore, D. (1999). Influence of text genre on adults’ monitoring of understanding and recall. *Educational Gerontology, 25*, 691–710.

Zhang, J. Y., & Barr, M. (2013). *Green politics in China: Environmental governance and state-society relations*. London, England: Pluto Press.

Zipes, J. (2006). The possibility of storytelling and theatre in impossible times. In M. Wilson (Ed.), *Storytelling and theatre: Contemporary storytellers and their art* (pp. xiv-xviii). Basingstoke, UK: Palgrave Macmillan.

Zipes, J. (2012). Living through stories. *Storytelling, Self, Society, 8*, 126–129.

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