



**University of
Zurich**^{UZH}

**Zurich Open Repository and
Archive**

University of Zurich
Main Library
Strickhofstrasse 39
CH-8057 Zurich
www.zora.uzh.ch

Year: 2017

Frame Analysis in Climate Change Communication: Approaches for Assessing Journalists' Minds, Online Communication and Media Portrayals

Schäfer, Mike S ; O'Neill, Saffron

Abstract: Framing—selecting certain aspects of a given issue and making them more salient in communication in order to “frame” the issue in a specific way—is a key concept in the study of communication. At the same time, it has been used very differently in scholarship, leading some to declare it a “fractured paradigm,” or an idea whose usefulness has expired. In studies of climate change communication, frame analyses have been used numerous times and in various ways, from formal framing approaches (e.g., episodic vs. thematic framing) to topical frames (both generic and issue-specific). Using methodological approaches of frame analysis from content analysis over discourse analysis and qualitative studies to experimental research, this research has brought valuable insights into media portrayals of climate change in different countries and their effects on audiences—even though it still has limitations that should be remedied in future research.

DOI: <https://doi.org/10.1093/acrefore/9780190228620.013.48>

Posted at the Zurich Open Repository and Archive, University of Zurich

ZORA URL: <https://doi.org/10.5167/uzh-148182>

Book Section

Published Version

Originally published at:

Schäfer, Mike S; O'Neill, Saffron (2017). Frame Analysis in Climate Change Communication: Approaches for Assessing Journalists' Minds, Online Communication and Media Portrayals. In: Nisbet, Matthew; Ho, Shirley; Markowitz, Ezra; O'Neill, Saffron; Schäfer, Mike S; Thaker, Jagadish. Oxford Encyclopedia of Climate Change Communication. New York: Oxford University Press, n/a.

DOI: <https://doi.org/10.1093/acrefore/9780190228620.013.48>

Oxford Research Encyclopedia of Climate Science

Frame Analysis in Climate Change Communication

Mike S. Schäfer and Saffron O'Neill

Subject: Climate Change Communication Online Publication Date: Sep 2017

DOI: 10.1093/acrefore/9780190228620.013.487

Summary and Keywords

Framing—selecting certain aspects of a given issue and making them more salient in communication in order to “frame” the issue in a specific way—is a key concept in the study of communication. At the same time, it has been used very differently in scholarship, leading some to declare it a “fractured paradigm,” or an idea whose usefulness has expired. In studies of climate change communication, frame analyses have been used numerous times and in various ways, from formal framing approaches (e.g., episodic vs. thematic framing) to topical frames (both generic and issue-specific). Using methodological approaches of frame analysis from content analysis over discourse analysis and qualitative studies to experimental research, this research has brought valuable insights into media portrayals of climate change in different countries and their effects on audiences—even though it still has limitations that should be remedied in future research.

Keywords: framing, climate change, frame-building, journalism, visual framing, content framing

Introduction

Climate change is an important issue, potentially the “challenge of our generation”, as United Nations’ General Secretary Ban Ki Moon put it (Guardian, 2007). But at the same time, it is an issue that is complex, in many aspects invisible, lies beyond the life-worlds and biographical horizons of many people, and, thus, is difficult to comprehend for many (see Moser, 2010). For such “unobtrusive issues,” mediated communication is of particular importance. Fittingly, journalistic and news media have been shown to be important and often trusted sources of information about such issues and also about climate change (e.g., Schäfer, 2015; Stamm, Clark, & Eblacas, 2000) and to have effects on audiences. The amount of media attention to climate change can influence how important the broader public as well as political decision-makers perceive the issue to be (e.g., Liu, Lindquist, &

Vedlitz, 2011; Sampei & Aoyagi-Usui, 2009; Weingart, Engels, & Pansegrau, 2000). Media portrayals have been shown to impact what people know (or think they know) about climate change, their trust in the underlying science, and their attitudes toward certain political and societal measures and their own actions (e.g., Arlt, Hoppe, & Wolling, 2011; Nisbet, 2009; Taddicken, 2013).

Accordingly, the number of studies analyzing news media as well as online portrayals of climate change has increased since the mid-2000s (Schäfer & Schlichting, 2014, p. 148). Among these studies—and in line with the concept's generally high importance in media and communication science—works on “framing” have been particularly prominent. Framing, in its most general sense, refers to communicative processes of sense-making in which some aspects of reality are emphasized and others are de-emphasized. Accordingly, the respective studies have analyzed under which general perspective climate change is presented, which of its aspects are highlighted and which are not, as well as which claims, demands, and responsibilities are deduced from it (Nisbet, 2009). They have done this with different analytical foci, using different methods and analyzing different countries as well as different media (e.g., Kenix, 2008; Shehata & Hopmann, 2012; Takahashi, 2011), and they used different understandings of frames and framing as well as different approaches toward frame analysis.

The article at hand aims to provide an overview over this variety of approaches, both in general and with specific focus on studies of climate change communication. It will first outline the core and history of the framing concept and elaborate on its variants and uses. Then it will survey how the concept has been used in climate change communication, highlight the importance and approaches in research on visual frames, identify prevalent as well as underresearched approaches, and highlight ongoing research gaps.

Framing: The Core Concept and Its History

Conceptually, framing has diverse roots, which stem from different disciplines and reach back to the late 19th and early 20th centuries:

- In the early 20th century, *Gestalt psychology* analyzed how individuals organize the variety of their sensual impressions into coherent perceptions and stressed that cognitive, socialized, and culturally influenced processes played a crucial role in organizing impressions into an overarching “Gestalt” (Schultz & Schultz, 2015).
- *Interpretive sociology*, following Max Weber, Alfred Schütz, and others, advanced similar ideas from a sociological point of view: they argued that perceptions and interpretations of reality are always negotiated in human interaction and communication (Matthes, 2014). These social interactions determine, according to this school, which objects are focused on by individuals and social groups, which aspects of

these objects are seen as relevant, and how they are interpreted and talked about. Interpretive sociologist Erving Goffman popularized the term “frame analysis” (Goffman, 1986) for his focus on human interactions.

- Since the 1970s, political scientists and sociologists have focused on the emergence, mobilization, and effects of (*new*) *social movements*, and in this tradition, framing has also played an important role (for an overview, see Benford & Snow, 2000). In addition to the degree of deprivation addressed by a movement, its resources and its surrounding “opportunity structures,” the “framing” of its causes and aims as well as its self-framing were seen as important factors influencing movement success (Gerhards, 1995).
- In the early 1990s, and partly triggered by movement research’s turn toward public and media debates (e.g., Gamson, 1988; Gamson & Modigliani, 1989; Gamson & Wolfsfeld, 1993), the framing concept arrived in *media and communication science* and quickly developed into one of the most prominent concepts in the field (Matthes, 2009). The basic assumption is that media—due to their limited carrying capacity, their working routines, and their ideological positions—must always select aspects of reality for coverage; that, accordingly, they frame many issues in certain (fairly static) ways; and that therefore media framing holds particular power at the societal level.

Probably because of these diverse roots and the wide use of framing in various schools of media and communication-related research, the concept has repeatedly been described as lacking coherence conceptually. The best-known such expression is the diagnosis of framing as a “fractured paradigm” (Entman, 1993), which emphasized the different and partly contradictory definitions, foci, and underlying paradigms that could and still can be found in framing research. Notwithstanding several attempts for stronger conceptual integration (e.g., Matthes, 2007; Scheufele, 2003; Semetko & Valkenburg, 2000), frame analysis is still neither a full-fledged theoretical paradigm nor a coherent methodological approach (e.g., Potthoff, 2012), and quite recently its usefulness in media effects research has been criticized (Cacciatore, Scheufele, & Iyengar, 2016).

Notwithstanding these divergences, however, several scholars have tried to extract a common ground and shared conceptual denominators from the framing literature. The smallest such denominator shared by the different outlined framing traditions is that framing is a *fundamentally constructivist concept*. Framing analyses assume that phenomena are not—or cannot be—perceived objectively and similarly by different individuals, organizations, or groups. Instead, these scholars assert that perception and communication always contain combinations of “selection and salience” (Entman, 1993, p. 52) or “persistent selection, emphasis, and exclusion” (Gitlin, 1980, p. 7). Accordingly, they understand framing as perceptual and/or communicative processes of sense-making in which some aspects of reality are selected and/or emphasized and others are not selected and/or de-emphasized (see Benford & Snow, 2000; Entman, 1993; Gamson & Modigliani, 1989; Matthes & Kohring, 2008). In media communication, these processes of selection and salience can be found at many points in the communication cycle, from stakeholders

Frame Analysis in Climate Change Communication

aiming to make their positions heard, journalists writing news stories, to audiences interpreting mediated communication (Gerhards & Schäfer, 2006; Matthes, 2007; Potthoff, 2012). Framing thus defines “horizons of sensemaking” for individuals and groups (Matthes, 2007; Scheufele, 2003).

Within these similarities, framing definitions still vary. This can be illustrated using the two definitions that are, according to a meta-analysis (Matthes, 2009), most widely used within the field. Sociologists Gamson and Modigliani (1989, p. 143), on the one hand, define frames as “the central organising idea or storyline that provides meaning to an unfolding strip of events.” In their view, a frame “suggests what [a] controversy is about, the essence of the issue,” and can be embodied in various ways in a text—in an elaborate argument, in a picture, in a metaphor, or in other forms. The frame’s representation in a text, therefore, may vary. On the other hand, political communication scholar Entman argues that framing implies promoting “a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation” (1993, p. 52)—i.e., that frames are more elaborate arguments that are manifest in text and have a certain internal structure.

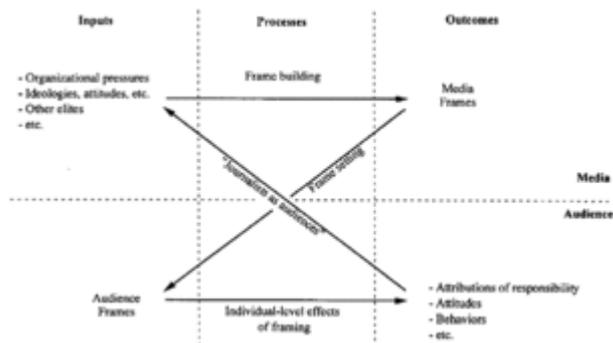
Framing in Communication Research

Framing is a concept that has been widely used in the social sciences, analyzing media coverage, stakeholder communication, public perceptions of issues, movement mobilization, and other topics. It has been employed to analyze various steps of the communicative process, with different definitions and conceptual understandings of frames, and with a diverse set of methods. This variety will be introduced in this section.

Framing Different Aspects of the Communication Process

Framing scholars assume that the entire process of communication can be analyzed with this conceptual lens (Entman, Matthes, & Pellicano, 2009; Matthes, 2007, p. 21), and several schematic overviews of these perspectives have been advanced. The most prominent, by Scheufele (1999; see also Scheufele, 2000; Figure 1), distinguishes media and audience frames along the vertical axis of a 2 × 3 matrix and the role of frames as dependent or independent variables on these levels on the horizontal axis. Connecting the cells of the matrix are, then, processes such as frame-building—referring to the intrinsic and extrinsic influences on the frames eventually employed in media coverage—and frame-setting—meaning “framing effects” of media frames on audience frames.

Frame Analysis in Climate Change Communication



[Click to view larger](#)

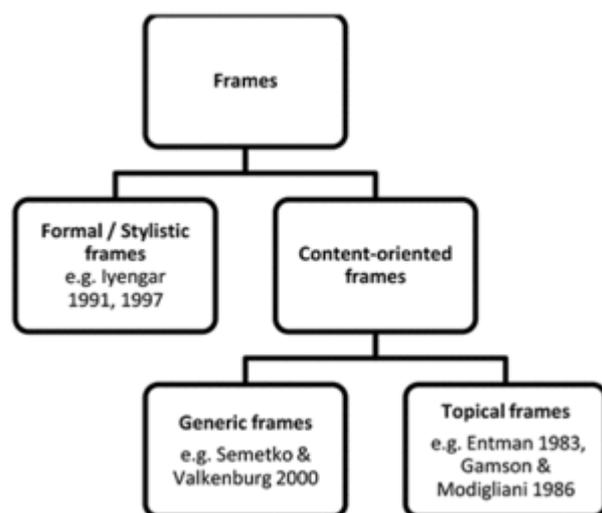
Figure 1. Schematic Overview of Perspectives of Media-Related Framing Research. (From Scheufele, 1999, p. 115)

Media and communication scholars have analyzed all parts of this matrix, albeit some to a greater degree than others. They have focused, first, on the strategic use of framing among societal stakeholders and communicators in their attempts to make their positions salient in public debates (e.g., Gerhards &

Schäfer, 2006; Schäfer, 2007), for example, on corporations (Schlichting, 2013) or (new) social movements and nongovernmental organizations (NGOs; Benford & Snow, 2000). Second, they have analyzed the mental frames of journalists and to what extent they influence how they select and present news (for an overview, see Scheufele, 2003). Third, and most extensively, they have used framing approaches to analyze media coverage and online communication about different issues, aiming to describe “media frames” and their variance between countries, media, and topics, or over time (for overviews, see Matthes, 2007, 2014). Fourth, scholars have focused on framing effects—i.e., on the role of media framing in the emergence of audience frames and the importance of audience frames as predictors of attitudes and behaviors (e.g., Matthes, 2007).

Types of Media Frames

To analyze these aspects of the communication process, different types of frames have been employed. Schematically, they can be organized in a flowchart (Figure 2).



[Click to view larger](#)

Frame Analysis in Climate Change Communication

Figure 2. Schematic Overview of Types of Frames.
(Adapted from Matthes, 2007, p. 58)

First, “formal-stylistic” and “content-oriented” frames can be distinguished.

Formal-stylistic frames focus on the structure or formal presentation of a communicative text instead of on its content (for more detail, see Matthes, 2007). Accordingly, they typically have a high degree of abstraction. The most prominent example is arguably Iyengar’s (1991, 1997) distinction of episodic frames—which present an issue isolated from its history and wider context—and thematic frames—which contextualize the issue and provide rich background information. Other formal-stylistic frames distinguish “strategy” vs. “issue” frames (Cappella & Jamieson, 1997), “diagnostic” or “prognostic” framing (e.g., Schmidt, 2012), or “gain” vs. “loss” frames (Detweiler, Bedell, Salovey, Pronin, & Rothman, 1999).

All *content-oriented frames* share a focus on the content of communication—but their degree of abstraction differs. Among these, Matthes (2007) distinguishes between “generic” and “topical” frames. *Generic frames* propose and use frame sets that are content-related but not issue-specific. Such frames, sometimes called “master frames” in early framing literature (e.g., McAdam & Snow, 1997), are seen as general interpretations or patterns that transcend individual issues. The most widely used example are Semetko and Valkenburg’s (2000) five generic frames—“consequences,” “responsibility,” “conflict,” “human interest,” and “morality”—each operationalized with a specified subset of categories, which have been applied to various issues (e.g., de Vreese & Boomgaarden, 2003; Gan, Teo, & Detenber, 2005).

In contrast, *topical frames*, while also being content-related, are issue-specific. Most framing scholarship uses these types of frames in their studies, and the most widely cited definitions by Entman (1993) and Gamson and Modigliani (1989) also fall in this category. Such studies reconstruct frames that are specific to one issue. Accordingly, they tend to be more specific yet less transferable to other issues—like the “fetal life” frame that Ferree, Gamson, Gerhards, and Rucht (2002) found in media coverage on abortion. Indeed, there is often even limited crossover between topical frames on the same issue (see, e.g., the many topical frames devised by diverse authors that ostensibly cover the issue of climate change in O’Neill, Williams, Kurz, Wiersma, & Boykoff, 2015).

Methods of Framing Research

Framing research employs a variety of methods inspired by content analysis (see Metag, 2017), discourse analysis (see Koteyko & Atanasova, 2017), and (corpus-)linguistic methods (see Flottum, 2017), among others. Jörg Matthes distinguishes four ideal types of frame analysis to describe approaches that exist in scholarship even though they often overlap in practice (2007, 2014; see also Matthes & Kohring, 2008; Scheufele, 2003, see also table 1).

Frame Analysis in Climate Change Communication

Table 1. Strengths and Weaknesses of Methods of Frame Analysis

Frame Analysis in Climate Change Communication

	Hermeneutic-qualitative method	Manual holistic method	Manual reductionist method	Linguistic method
Method	Qualitative, interpretative approaches, discourse analysis	Standardized manual content analysis	Standardized manual content analysis	Corpus-linguistic methods, topic modeling
Typical data	Media texts, interview/discussion transcripts, documents	Media texts, stakeholder documents	Media texts	Media texts, online and social media data
Strengths	Close reading/detailed descriptions of data, reconstruction of latent meaning	Suitable for medium- to large-n studies, allows generalizability, international comparisons, etc.	Suitable for medium- to large-n studies, allows generalizability, international comparisons, etc., frame elements can be relatively detailed, ex-post composition of frames	Suitable for large-n/"big data" studies, allows generalizability, international comparisons, etc., strong inductive component/limits researcher influence
Weaknesses	Restricted to small(er)-n analysis, generalizability not always clear, methodological	Holistic coding of frames makes adaptation to specific issues/contexts more difficult, latent meaning more difficult	Latent meaning more difficult to assess, coding of frame elements has to be	Restricted to manifest elements of texts like words, relation of results (like topics) to

Frame Analysis in Climate Change Communication

	documentation sometimes vague	to assess, coding has to be rather general, often in “frame exists/ exists not in text” format	rather general, coding needs more resources	“framing” concept not fully clear
--	----------------------------------	--	--	--------------------------------------

Source: Adapted from Matthes, 2007, 2014; see also Matthes & Kohring, 2008; Scheufele, 2003.

- *“Hermeneutic” or “qualitative” frame analysis* inductively construct frames, typically based on media content, document, or (qualitative) interview data. “Rooted in the qualitative paradigm, these studies are based on small samples that mirror the discourse of an issue or an event. Typically, frames are described in depth and no quantification is provided.” (Matthes & Kohring, 2008, p. 259). These close descriptions of the material often reproduce topical, issue-specific frames that characterize the case at hand in detail, but they are “labour intensive, often based on small samples, and can be difficult to replicate” (Semetko & Valkenburg, 2000, p. 94). Also, “[a]lthough most of these studies are well documented and exceptionally thorough[,] it is fairly difficult to tell how the frames were extracted from the material” (Matthes & Kohring, 2008, p. 259), which has raised questions about selection bias and robustness of the method (for examples, see König, 2013). Therefore, Tankard (2001, p. 98) argues that “there is a danger in this kind of lone-scholar analysis that the identification of a set of possible frames can be done arbitrarily.”
- *“Manual holistic” approaches* to frame analysis use an a priori frame definition and frame set which are then searched for, typically, in media material or written or oral stakeholder statements (Matthes, 2007). The framesets used in these studies are sometimes based on qualitative pre-studies (e.g., Schäfer, 2009; Tynkkynen, 2010), on literature reviews (O’Neill et al., 2015), and/or on pre-existing, partly generic frame sets that ought to be employed on different topics (e.g., Semetko & Valkenburg, 2000). The chosen method is usually standardized manual or semi-automatic content analysis. Measurement models are usually more explicit in this tradition compared to qualitative approaches (König, 2013). Another advantage is that the method can generally be employed for large(r) samples of texts and a broad range of frame types. However, ensuring coder reliability can be challenging. After all, frames are abstract, partially latent constructs not always easily recognizable in texts and, therefore, difficult to identify and code reliably (Matthes, 2007). Therefore, “the reliability and validity of this approach strongly depend upon the transparency in extracting the frames ... Without naming the criteria for the identification of frames, their assessment falls into a methodological black box. In other words, one runs the risk of extracting researcher frames, not media, [stakeholder or audience] frames” (Matthes & Kohring, 2008, p. 260). Another problem is the approach’s adaptability, namely its flexibility over time and its appropriateness for a given specific issue, especially when generic frames are used “deductively” (see Matthes & Kohring, 2008). Also, “this method is quite inflexible when it comes to the identification of newly emerging frames” (Matthes & Kohring, 2008, p. 263).

- “*Manual reductionist*” approaches use a priori definitions of frame elements, which are subsequently used in standardized content analysis and, eventually, used to (re)construct frames statistically (Matthes, 2007). The underlying definition of framing is typically Entman’s (understanding of framing as selecting “some aspects of a perceived reality and mak[ing] them more salient in a communicating context, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation” (Entman, 1993, p. 52). Along the latter four dimensions, “frame elements” are defined and coded in manual content analyses. Afterwards, reductionist statistical approaches like cluster analysis, latent class analysis, or factor analysis are used to identify which elements typically appear together in communication—and these constellations are then interpreted as frames and labeled interpretively (Matthes, 2007; see also Matthes & Kohring, 2004, 2008). This approach is able to process medium- to large-n corpora of texts, and coding frame elements is more reliable than coding entire frames, as frame elements are more specific, more manifest, and more easily identifiable. In turn, however, assembling them to frames can be challenging as the clusters, factors, or classes produced statistically use empirical co-presence instead of topical coherence as the guiding criterion.
- In “*linguistic*” or “*computer-assisted*” approaches, “frames are fundamentally identified by analyzing the selection, placement, and structure of specific words and sentences in a text, [arguing] that specific words are the building blocks of frames” (Matthes & Kohring, 2008, p. 260). Linguistic approaches “distinguish structural dimensions of frames that can be measured: syntax, script, theme, and rhetoric” (Matthes & Kohring, 2008, p. 260) and assemble them to frames (e.g., Pan & Kosicki, 1993), but the method’s complexity makes it difficult to apply it on large amounts of texts. “Computer-assisted” approaches (which are also called “frame mapping” at times), in contrast, can be applied to large text corpora. They identify frames by searching for specific and/or typical word combinations in texts (e.g., Miller, 1997; Miller & Riechert, 2001). On the one hand, this approach is highly reliable, as “[f]rames are not “found” by the researcher but “computed” by the computer program” (Matthes & Kohring, 2008, p. 261). On the other hand, it “reduces frames to clusters of words” (Matthes & Kohring, 2008, p. 260) and focuses on manifest characteristics of texts only—leading to concerns about the validity of the approach (e.g., Hertog & McLeod, 2001). At present, these computer-assisted approaches have also been limited to analysis of written text only, rendering visual material obsolete in frame analysis.

Framing Approaches in Climate Change Communication

Framing approaches are common in climate change communication studies. As mentioned above, climate change framing research exists at all stages within the communication cycle—although not all stages have received equal attention. For example, studies have attempted to analyze how stakeholders communicate their positions on climate change and try to engage in “frame building,” while others have examined what frames journalists have when they select aspects of and perspectives on climate change for coverage. Significant scholarly effort has studied how news and online media frame the issue of climate change. Increasingly, scholars are also interested in how audiences perceive climate change–framed information (see Nisbet, 2009)—although these studies on audience perception of framed information (or framing effects) will not be covered in this review as they draw on significantly different methodologies.

Naturally, framing has been operationalized, measured, and evaluated differently in these studies. These differences will be laid out in the following section.

Analyzing Stakeholder Framing

Climate change—including its extent, causes, and characteristics—is “deeply contested[, with] considerable competition among (and between) scientists, industry, policymakers and non-governmental organizations (NGOs), each of whom is likely to be actively seeking to establish their particular perspectives on the issues” (Anderson, 2009, p. 166). These stakeholders jostle to position themselves and their views prominently in the public arena and, in doing so, aim to frame the issue accordingly. A considerable number of social-scientific studies from different disciplines has analyzed these efforts in recent years, mostly using variants of qualitative-hermeneutic framing approaches, and “shown that many concerned parties exist in the case of climate change, which devote large amounts of monetary, personal, cultural and/or symbolic resources to the issue” (Schäfer, 2015, p. 855).

The “concerned party” that has arguably received the most scholarly interest are NGOs and, more specifically, environmental NGOs (eNGOs) like Greenpeace and the World Wildlife Fund (for overviews, see Hall & Taplin, 2007; Schmidt, 2012). Such studies have been presented for countries like Australia (e.g., Hall & Taplin, 2008), China (e.g., Schroeder, 2008), Germany (e.g., Schmidt, 2012), the United Kingdom and the United States (e.g., Doyle, 2009), among others. Typically, these studies employ qualitative methodology to reconstruct topical, climate change–related frames. Likely due to the event-oriented, spectacular communication of some eNGOs, a number of qualitative studies of visual

Frame Analysis in Climate Change Communication

communication and visual framing exist as well (e.g., Doyle, 2007). Quantitative studies of NGO communication, however, are almost absent from the literature (for an exception, see Jun, 2011).

These studies have shown, for example, that NGO framing has focused on “diagnostic framing” (Schmidt, 2012) early on, i.e., aiming to describe the extent and potential effects of climate change in order to make this unobtrusive issue accessible for a broader public (see Nisbet & Kotcher, 2009). “Prognostic framing,” portraying individual behavioral change and encouraging a “radically different way of living a sustainable and cooperative life” (Doyle, 2009, p. 114), was added later (e.g., Koteyko, Thelwall, & Nerlich, 2010; Schroeder, 2008).

A considerable body of scholarly literature also exists regarding *stakeholders* from the economic sector—companies, industrial associations, trade unions, or industry-related think-tanks—and their framing of climate change (an overview can be found in Schlichting, 2013). These studies are often driven by the assumption that such stakeholders aim to frame issues in ways that are most conducive to their businesses and that, therefore, they employ strategic framing to further their goals (see Ihlen & Nitz, 2008; Nisbet, 2009). The respective studies stem largely from scholarship on political science and management as well as from communications science, and they mostly focus on Western countries, particularly in North America, Western Europe, and Australia (see Schäfer & Schlichting, 2014). In terms of methods, they are typically qualitative in nature. Even though the specific methods they use to reconstruct stakeholder communication and framing are sometimes not entirely clear (e.g., Dunlap & McCright, 2011), they are usually based on in-depth interviews with stakeholder decision-makers or spokespersons and/or document analysis (e.g., Ihlen, 2009). A notable exception is Schlichting’s (2013) meta-analysis, in which she synthesized 38 scholarly studies on strategic framing aiming to provide an integrative typology and a timeline for climate change communication by “industry actors” in Western countries. Often they aim at reconstructing topical content frames, i.e., climate change-specific, non-generic frames (e.g., Gupta, 2010; Newell, 2000), and they do so employing hermeneutic-qualitative, sometimes also manual holistic framing methods (e.g., Schlichting, 2012, 2013).

These studies have produced several framing typologies including frames like the “scientific uncertainty” frames that were prominent especially in Anglophone countries in the early 1990s (e.g., Dunlap & McCright, 2011; McCright & Dunlap, 2003) or the later “industrial leadership” framing advocating for technological solutions and the industry’s leadership role in fighting climate change (e.g., Ihlen, 2009). These frames and typologies have been shown to differ between countries (Gupta, 2010) and over time (Schlichting, 2013) and provide a detailed picture of the strategic framing of climate change of industry actors. The main caveats are that these studies focus on Western countries and that their qualitative nature allows for close readings of specific social and national contexts but sometimes hinders larger comparisons.

Frame Analysis in Climate Change Communication

A third group of stakeholders, which includes a variety of organizational types such as (pseudo)NGOs or “astroturfing” organizations, movements, campaigns, think tanks, and other communicative “front groups” (Dunlap & McCright, 2011), has also been analyzed repeatedly, albeit almost exclusively in the small number of Anglophone countries where they are more widely spread: climate change skeptics (e.g., Hoffman, 2011; McCright & Dunlap, 2003). Employing similar, qualitative methodology, these studies have described how conservative, skeptical organizations in the United States, the United Kingdom, and Australia continuously focus on “diagnostic” framing—Does the problem exist, and is it man-made?—(see Hoffman, 2011), emphasize its “non-problematicity” (McCright & Dunlap, 2003, p. 348), and thus divert from debates about potential solutions (Hoffman, 2011).

In contrast, surprisingly few studies have focused on how political decision-makers and institutions as well as scientists frame climate change—partly, because the framing approach is not as prominent in political science and because its essentially constructivist underpinning may be seen as inappropriate for analyzing science communication by some. The small number of existing studies indicates, however, that analyses in this field could be fruitful additions to the respective scholarship: Weingart et al.’s (2000, 2002) “discourse analysis” of the early debates around climate change in Germany (for a summary, see Schäfer, 2017) demonstrates how scientists took an active role and successfully employed sensationalist framing (talking about the “*Klimakatastrophe*,” or “climate catastrophe”) to set the issue on the media and political agendas. And other studies have shown that climate scientists are willing to speak about their research in public (Ivanova, Schäfer, Schlichting, & Schmidt, 2013) and, under certain circumstances, to (over)emphasize certain aspects of it (Post, 2014).

Journalistic Framing

Journalists are important in the process of climate change communication. Even though journalists themselves are embedded in, and influenced by, different normative, organizational, and social layers in their work (Shoemaker & Reese, 1995; see also Engesser (2017) and Gibson (2017), even though their position in public communication has changed from “gatekeeper” to “gatewatchers” (Bruns, 2008), and even though new journalistic role models have emerged (Allan, Fahy, & Nisbet, 2011), their impact on the selection of topics, stakeholders, and perspectives in media coverage is still considerable. And “[t]here is empirical evidence that the journalists’ scientific knowledge [,] professional norms [,] ideological standpoints [,] political alignment [,] and expertise [...] influence their coverage of climate change” (Engesser & Brüggemann, 2016, p. 826).

Consequently, journalists’ role in climate change communication has received some scholarly interest. Most of these studies are content analyses, however, that measure journalistic output and extrapolate information about the journalists from there (e.g., Eide, Kunelius, & Kumpu, 2010), while qualitative or quantitative surveys among

Frame Analysis in Climate Change Communication

journalists and in-depth ethnographic studies in newsrooms are largely missing. Some nascent work shows the utility of this approach. Boykoff (2007), for example, carried out several short semi-structured interviews with journalists to help illuminate his content analyses of media reporting on climate change, though the brevity of the interviews and quoted data limits the findings of this particular study. Similarly, Berglez (2011) used interviews to shed light on the news media's climate change reporting in an interview project of 14 Swedish journalists, and Lück, Wozniak, and Wessler (2016) have analyzed journalists' interactions with stakeholders at COP summits, but neither engage extensively with the framing concept.

Hardly any studies have focused on journalists' framing of climate change. Brüggemann (2014) was the first to address this deficit, with theoretical research into journalistic frame-setting. He then carried out empirical work (Engesser & Brüggemann, 2016) using a standardized survey of 64 "climate journalists" from upmarket media, tabloids, and regional print media in Germany, India, Switzerland, the United Kingdom, and the United States to map out journalistic frames on climate change. Following Entman's definition of frames and using a reductionist approach toward framing, the authors asked the journalists about "frame elements" (Engesser & Brüggemann, 2016): they asked about journalists' perceptions of and attitudes toward the problem definition (does global warming have positive or negative consequences, is it an ecological problem etc.), toward its causes (such as "capitalism and consumption" or "lobbying and national interests"), and toward potential solutions (like emissions reductions or "technological solutions"). Subsequently, answers were statistically assembled, using a two-step principal component analysis, into frames. Engesser and Brüggemann identified five frames "that vary between attributing the responsibility for climate change to lobbying and national interests, blaming consumerist culture and the capitalist system, and expressing technological optimism" as well as a "sustainability frame" (2016, p. 825).

But much more work is needed. Even though Engesser and Brüggemann have demonstrated the relevance of analyzing journalists' frames, their analysis is (naturally) limited in various ways. Details of the media organization or position of the journalists were not provided, for example, and more in-depth, qualitative detail of the frames is lacking. Accordingly, both Brüggemann (2014) and Engesser and Brüggemann (2016) call for more research in this area, in particular for qualitative research that would help to identify the conditions that shape the process of frame-building and in combining in-depth interviews with journalists with analysis of their articles to connect news frames and the situations in which they originated.

Content Frames

In contrast to scholarship on stakeholder framing, where a qualitative framing approach aiming to reconstruct topical, issue-specific frames is clearly most prevalent, and the scholarship on journalists' frames, which is almost non-existent, a larger number of framing analyses of news media and online content exist. In many of these studies, the framing approach presents itself as a "fractured paradigm" (Entman, 1993), where framing theory is often used loosely and with imprecision. This is certainly true of the climate change communication literature on the media frames which emerge from the frame-building process. While a large body of literature draws more or less loosely on the concept of framing, or on allied concepts such as climate "discourses," relatively few studies explicitly define their theoretical approach and analytic method to examine the "issue framing" of climate change (e.g., Antilla, 2005; Dirikx & Gelders, 2010A; Doulton & Brown, 2009; Lück, Wessler, Wozniak, & Lycarião, 2016; Olausson, 2009; Shehata & Hopmann, 2012; O'Neill, 2013; O'Neill et al., 2015; Painter, 2013). These studies represent many of the framing types and framing approaches introduced above, but to very different degrees (see table 2).

While *formal-stylistic framing*—such as the occurrence of episodic and thematic framing—has been often analyzed in fields like political communication (Iyengar, 1991, 1997), it has not been taken up strongly in climate change communication. A standardized content analysis of U.S. television news has shown that climate change impacts and potential measures that could be taken against it are "rarely discussed in the same broadcast," that coverage therefore "provides an inconsistent efficacy message," and that this points toward a rather episodic framing of the issue (Hart & Feldman, 2014)—a finding that could have implications for audiences' policy preferences and behaviors (Hart, 2011). But scholarly work on formal-stylistic frames in climate change communication is lacking.

In contrast, practically all studies that have analyzed the framing of climate change in media or online content have searched for *content-oriented frames*. Among them, again, the use of *generic content-oriented frames* is the exception. Semetko and Valkenburg (2000) have proposed a set of five such frames envisioned to span different issues but developed originally for the analysis of political communication: conflict, human-interest, responsibility, morality, and economic consequences. Dirikx and Gelders (Dirikx & Gelders, 2010A, 2010B) have used this taxonomy in their analyses of Dutch media coverage on climate change and showed that these frames appear to a considerable extent in climate change coverage (except for morality and human-interest frames, which appear less often). Similarly, a few studies have employed a generic frameset proposed for the analysis of biotechnology debates in the 1990s (Durant, 1992; Durant, Bauer, & Gaskell, 1998) to climate change communication, showing that frames like "conflict" or "Pandora's box" appear frequently in U.S. television news (Boenker, 2012) and print media (Engesser & Brüggemann, 2016).

Frame Analysis in Climate Change Communication

Most other scholars have used *issue-specific or topical content-oriented frames* in their analyses of climate change coverage or online communication. Among them, all the above-mentioned framing approaches have been employed. No one approach is inherently “better” for undertaking climate framing research than another, as the strengths of one approach are often the weaknesses of another (see Table 1 for an overview; see also Schäfer et al., 2016).

First, framing analyses using *qualitative-hermeneutic approaches* typically analyze smaller samples of print media coverage using qualitative content analysis or variants of (critical) discourse analysis and develop bottom-up taxonomies of climate change-specific frames. Olausson (2009), for example, analyzed 141 articles from three Swedish newspapers attempting to reconstruct how responsibility is framed in coverage of global warming and with what calls for collective action these frames co-occur. She found that the media call for action toward transnational political institutions and that they do so partly by downplaying scientific uncertainties. Similarly, Roosvall and Tegelberg (2013) use discourse analysis combined with Entman’s frame taxonomy to map the representations of indigenous peoples in Canadian and Swedish newspapers. Also using qualitative-hermeneutic framing approaches, Doulton & Brown (2009) employ discourse analysis for studying the U.K. press and Antilla (2005) uses a social-constructivist approach to reconstruct four frames from U.S. newspaper coverage.

Second, several studies have used a *manual holistic framing approach* in order to reconstruct media frames of climate change. Typically, they use larger samples of media texts, partly in cross-nationally comparative research designs. The frames that they look for in these texts are usually developed either deductively from surveying the scientific literature on framing climate change or by means of qualitative pre-studies. Painter (2013) represents such a study. In his analysis of 350 newspaper articles from Australia, France, India, Norway, the United Kingdom and the United States, he used a set of frames like “disaster,” “opportunity,” or “uncertainty,” which were derived from extensive literature reviews. Painter found that these frames are similarly prevalent in different Western countries, particularly around events like the publication of the Intergovernmental Panel on Climate Change’s (IPCC’s) Assessment Reports or around international climate change summits. Numerous other studies proceeded similarly: for example, Tynkkynen’s (2010) analysis of leading Russian newspapers, Trumbo’s (1996) study of five U.S. print media (in which he used Entman’s framing taxonomy without assembling the different frame elements statistically into frames), Takahashi’s (2011; see also Takahashi & Meisner, 2012) analyses of seven Peruvian print media, Shehata and Hopmann’s (2012) study of the U.S. and Swedish press over a 10-year period, Agwu and Amu’s (2015) and Nwabueze and Egbra’s (2016) analyses of Nigerian and Ghanaian newspapers, and Chetty, Devadas, and Fleming’s (2015) study of New Zealand’s newspapers.

Third, just a few studies use *manual reductionist framing approaches* to analyze climate change communication. Those that exist use medium- to large-n media or online corpora, typically of print media, and standardized content analyses to assess the prevalence of

Frame Analysis in Climate Change Communication

the framing dimensions outlined by Entman (1993), i.e., of problem definitions, evaluations, causes, and solutions. Lück et al. (2016) used this approach, for example, in their analysis of newspaper coverage in Brazil, Germany, India, South Africa, and the United States during four COP conferences (2010–2013). Coded frame elements were supposed to capture different views as to whether climate change exists, whether it is anthropogenic, what can be done to fight it, and who would be responsible to do it. The authors then used hierarchical cluster analysis to assemble these elements in a “global warming victims,” a “political dispute,” a “sustainable energy,” and a “common sense” frame. Specific to their approach was their use of “multimodal” frames (see also Wozniak, Lück, & Wessler, 2015) that include both textual as well as visual elements. Bowe, Oshita, Terracina-Hartman, and Chao (2014) use the same general framing approach but use cluster analysis to assemble not only frame elements but also speakers into frames (similar to Kohring & Matthes, 2002). Scholte, Vasileiadou, and Petersen (2013) employed an interpretive approach to assemble coded frame elements into larger frames. Yun, Ku, and Han (2014, p. 222) also used a variant of the reductionist approach, manually coding the climate change coverage of Korean newspapers into frame components and assembling them more interpretively using “cross-tabulation analysis” afterwards.

Fourth, the *linguistic or computer-assisted approach* has also been used in analyses of climate change communication. This approach aims to assemble manifest text characteristics, usually words, into larger clusters using corpus-linguistic methods such as latent dirichlet allocation (LDA). Because a large part of the process is handled by computers, large and very large text corpora are analyzed in this way. The caveat of these studies is that, conceptually, it remains unclear if such topic modeling really represents the totality of the framing paradigm (see Matthes & Kohring, 2008). Consequently, the studies that have used this approach in climate change communication do often not present themselves as framing studies. Kirilenko and Stepchenkova (2012), for example, who show that science-related topics have declined between 1995 and 2010 in the *New York Times* coverage and that policy-related topics have increased, do not position their analysis in the framing paradigm. Ivanova (2017) also uses topic modeling on newspaper data from 11 countries and shows how such topics converged in developed countries between 1996 and 2010. Likewise, Elgesem, Steskal, and Diakopoulos (2015), who analyze 1.3 million blog posts using probabilistic topic modeling, show different communities and also identify characteristic topics of communication that do not use the framing concept.

Frame Analysis in Climate Change Communication

Table 2. Frame Types and Framing Methodologies Used in Climate Change Communication, with Example Studies				
	Hermeneutic-qualitative method	Manual holistic method	Manual reductionist method	Linguistic/computer-assisted method
Formal/stylistic frames			Hart & Feldman (2014)	
Content-oriented frames: generic		Boenker (2012)	Dirikx & Gelders (2010A, 2010B)	
Content-oriented frames: topical	Antilla (2005), Doulton & Brown (2009), Olausson (2009), Roosvall & Tegelberg (2013)	e.g., Painter (2013), Shehata & Hopmann (2012), Takahashi (2011), Trumbo (1996)	Bowe et al. (2014), Lück et al. (2016), Scholte et al. (2013), Wozniak et al. (2015), Yun et al. (2014)	Elgesem et al. (2015), Ivanova (2017), Kirilenko & Stepchenkova (2012)

Visual (and Multimodal) Framing

Much of the work that exists to date examines only the text-based parts of a communication. Yet understanding how images are used is imperative, as the selection and promotion of particular types of imagery is a highly ideological process whereby the interests of the powerful become naturalized through specific imagery (Hall, 1973; Hansen & Machin, 2013). Unlike text, images are often not questioned: they are seen as representing an objective reality rather than as a normative statement constructing a particular way of viewing the world (Messaris & Abraham, 2001; Urry, 1992). In this article visuals are defined as the concrete image content elements of a media report (see Wozniak et al., 2015). This may include photographs, scientific figures, cartoons, infographics, and artistic representations among other types of imagery. Such visuals may be used to illustrate words or sound (e.g., a photograph alongside a newsprint article or a moving image alongside a voiceover on television) or used as a stand-alone image (e.g., a tweeted infographic).

Although framing scholarship has focused mostly on written text, there also is a growing literature on visual framing and current affairs, including work on news and elections (e.g., Grabe & Bucy, 2009) and war (e.g., Fahmy, 2010). Visual framing studies analyze visuals at different levels and are not directly comparable to Matthes's (2007) definitions (Table 1). Visual framing studies can be categorized most effectively using the Rodriguez and Dimitrova (2011) four-tiered model of identifying and analyzing visual frames as a way of analyzing any type of visual media content or audiences' perception of that content. Their conceptualization proposes examining visuals as (1) denotative systems (at a most basic level, asking, what is depicted?), (2) stylistic-semiotic systems (the conventions and visual styles that engender social meaning), (3) connotative systems (the ideas or concepts attached to the visual, or how social meaning is combined, compressed, and communicated), and (4) as ideological representations (answering the question: Whose interests are being served by these representations?). In terms of climate change, the visual dimension of communication has been neglected (Anderson, 2009; Hansen & Machin, 2013; Moser, 2010), and little of the research that does exist draws on the framing concept. The state of the field is now assessed compared to Scheufele's (1999) conceptualization (see Figure 1). Studies have also been associated with one of the Matthes (2007) framing categories (Table 1) and the Rodriguez and Dimitrova (2011) visual framing definitions.

In terms of frame-building, compelling imagery is a key factor in driving media coverage of an issue, especially on television (Bennet, 2011). Both the quantity and framing of climate news appear to be shaped by the availability of climate imagery (O'Neill et al., 2015). Wozniak, Wessler, and Luck (2016) carried out a visual study at the site of news frame production through an examination of media coverage of two COPs. The team assessed which professional group involved in communicating about the COPs (journalists,

Frame Analysis in Climate Change Communication

government spokespeople, and representatives from NGOs) were most successful in seeing their visual framing conceptions represented in mainstream print media coverage. To do this, they used a mixed-method approach, combining qualitative semi-structured interviews with individuals from these professional groups with a manual-holistic content analysis of news visuals and texts in media sources. The news visuals were identified through denotative analysis only. They found relatively more NGO-preferred visual framing in the resulting media coverage of the COPs. The research that exists in cataloguing climate change visual communication in the media indicates that climate change visual content is not used indiscriminately, and a diversity of imagery is used in different national and issue contexts (DiFrancesco & Young, 2011; Rebich-Hespanha et al., 2015; Smith & Joffe, 2009). Several studies have begun to examine visual framing of climate change in the media. For example, O'Neill (2013) examined visual framing of climate change in U.S., U.K., and Australian print media over an annual cycle. This study used a hermeneutic-qualitative approach, though it does provide some quantification in terms of the types of frame elements that occur and statistical analysis of frame occurrence and media characteristics. Representative visuals were then subject to an in-depth denotative, connotative, and ideological analysis. O'Neill (2013, pp. 13ff.) found that two frames dominated, a "contested and politicised" frame, and a "geographically and psychologically distancing" frame; with Murdoch-owned media outlets (News Corporation) being significantly more likely to visually frame climate change as "contested and politicised" compared to outlets under any other ownership. In a similar study, but instead using a manual-reductionist approach employing hierarchical clustering and visuals analyzed at the denotative level only, Rebich-Hespanha et al. (2015) examined the visual framing of climate change in U.S. newspapers and magazines over a 30-year period. They used a framework of 42 image frames, identifying 15 dominant visual narratives that commonly occurred in U.S. print news. Together, the findings from these two studies indicated that the content of climate visuals plays an important role in shaping the cultural politics of climate change. However, these studies are both limited by focusing on Anglophone news outlets and examining climate visuals in isolation from other communicative devices (such as text).

Emerging research has begun to integrate an understanding of visual framing into multimodal approaches to understanding climate change media frames. O'Neill et al. (2015) integrated visuals into their 10-part frame analysis of the media coverage of the IPCC Fifth Assessment Report. They undertook a multimedia study, examining coverage in print, on TV, and on social media, with both U.S. and U.K. media sources. This study used a manual-holistic approach, identifying visuals at the denotative level only (though identified through a coding schema that explicitly placed each frame, and likely co-occurring visuals, in socio-political and/or ideological contexts). They found different frames dominated coverage for the different Working Group Report releases of the IPCC and that framing also varied by media institution. The authors suggest that framing of the IPCC's Fifth Assessment Report (AR5) was influenced, in part, by the availability and newsworthiness of visuals. Wessler, Wozniak, Hofer, and Luck (2016) undertook an ambitious multimodal (textual-visual frames and narrative frames) and multi-country

study (Brazil, Germany, India, South Africa, United States) to examine the COPs between 2010 and 2013. They used a manual-reductionist approach employing hierarchical clustering, identifying visuals at the denotative level only (though again, they explicitly placed each frame and associated visuals in socio-political/ideological context). Four overarching multimodal frames were identified—global warming victims, civil society demands, political negotiations, and sustainable energy frames—and the distribution of these frames across the nations was relatively similar. Both studies demonstrate the application of multimodal (and, indeed, multi-country and multimedia) approaches to climate change communication framing research.

Desiderata of the Field and Research Perspectives

Framing approaches have proven to be fruitful in the field of climate change communication. Accordingly, they have been used widely, on many different cases, with different methodologies and understandings of frames. The respective studies have shown that the dominant frames in climate change communication appear to be similar in many countries (see Painter & Schäfer, 2017), usually spanning “settled science” and “uncertain science” as well as economically, politically, and morally charged frames, and that, in contrast, some frames (e.g., a “health” frame) are infrequently encountered (O’Neill et al., 2015). They have demonstrated that the occurrence of science-centric frames has decreased over time, whereas socio-political frames have become more important (Kirilenko & Stepchenkova, 2012). But they have also shown persistent differences between countries and world regions with regard to some frames—like the larger prevalence of skeptical framing in some Anglophone countries (Painter & Ashe, 2012) or the importance of postcolonial framing in India (Billett, 2010). This research sheds light on the many areas in climate communication framing research in need of deeper investigation. Following are six suggestions for further research in this area.

First, climate communication and framing researchers should expand the breadth of media examined. Currently, there is an overreliance on news aggregator sources of print news (e.g., LexisNexis), despite print’s limited reach (most people do not use print media to access news: the majority of people over 35 name television as their main source of news, whereas those under 35 name social media; Levy & Newman, 2014). This is likely primarily due to reasons of data accessibility and ease of analysis (Schäfer & Schlichting, 2014). Very few issue frame studies have analyzed news outputs on TV (except Nivas et al., 2016; O’Neill, Boykoff, Day & Niemeyer, 2013; Painter, 2014) or online (except O’Neill et al., 2015). The rise of social media has seen profound changes to social interactions and the communications cycle and so presents a particularly pressing concern for climate framing researchers. Where there has been allied work examining climate change communication

Frame Analysis in Climate Change Communication

on social media (e.g., Painter et al., 2016), these studies are generally limited to examination of the text content of Twitter coverage only (e.g., Kirilenko & Stepchenkova, 2014; Pearce et al., 2014), and such studies have often not used framing theory.

Second, researchers should go beyond the “usual suspects” in examining climate communications in and across (trans)national contexts. Much work currently focuses on Western Europe, North America, and Australia; a notable exception is the ongoing project by Eide et al. (2010), which, however, does not focus strongly on framing. Yet climate change is a transnational phenomenon, and accordingly studies beyond these borders and cross-nationally comparative studies are a worthwhile research design. At the same time they are a challenge for the construction of frames, which require a careful consideration of the right level between abstraction and specificity (with a key question being: Are there country specific frames?).

Third, studies should consider the role of frames over time. Most climate change framing studies have used their own schemata and definitions of climate change frames. This limits applicability in comparing climate framing over time. Regardless of the schemata used to define frames, studies could consider a temporal dimension to their study.

Fourth, greater attention is required on the different communicative devices that comprise frames, especially the role of visuals. Most climate framing analyses focus on newspaper text and do not analyze the rich visual detail (headline, lede paragraph, photos, infographics, etc.) of the actual printed page. Yet analyzing the actual page the reader views is important, as these details may affect the reader in particular ways. And, beyond print media, visuals play a very important role in climate communication for both legacy and new media players on social media (Painter et al., 2016). Even if within a particular culture an interpretation of an image appears self-evident, this is simply because the visual is so widely distributed and understood within that particular setting that it is no longer seen as being a socially constructed object (O'Neill & Smith, 2014). Visuals need to be recognized and analyzed as key communicative devices.

Fifth, climate framing studies should refocus their efforts on understanding framing at all points in the communication cycle. Currently, there is a distinct bias in the types of climate change framing research carried out, with the great majority of studies focusing on cataloguing “media frames” (see Figure 1). Indeed, much of this work can be theoretically weak and would be improved by researchers explicitly defining their theoretical and methodological approaches to examining climate change media framing. But the broader point is that describing which media frames exist “out there” cannot tell us much about how particular frames come to exist in the world (“frame building”) or how people connect the ways they frame climate change in their minds with the media frames they encounter (“frame-setting”). There has been far less research on these two important processes, and they are worthy of considerable study.

Frame Analysis in Climate Change Communication

Sixth, there is a need for integrated and interdisciplinary climate framing studies, where framing is used as a theoretical basis for exploring climate communication across several steps of the—or the entire—climate change communication cycle. Leading scholars have called for an integrated approach to investigating framing, which takes all parts of the communication cycle seriously (e.g., de Vreese, 2012). As Olausson and Berglez (2014) have stated, it is virtually impossible to understand mediated climate interactions without insights from frame-building, and it is likewise difficult to understand audience engagement without research using real-world media content analyses. Yet projects that synthesize knowledge across several parts of the communication cycle are rare. Wozniak et al. (2016) undertook a study that synthesized understandings from frame-building and media frames showing the considerable benefits to examining multiple processes of framing within a single research project. However, to our knowledge, no projects to date have synthesized insights across the entire climate change communication cycle.

References

- Agwu, A. E., & Amu, C. J. (2015). Framing of climate change news in four national daily newspapers in southern Nigeria. *Agricultural Information Worldwide*, 6, 11–17.
- Allan, S., Fahy, D., & Nisbet, M. C. (2011). The science journalist online: Shifting roles and emerging practices. *Journalism*, 12(7), 778–793.
- Anderson, A. (2009). **Media, politics and climate change: Towards a new research agenda**. *Sociology Compass*, 3(2), 166–182.
- Antilla, L. (2005). Climate of scepticism: US newspaper coverage of the science of climate change. *Global Environmental Change-Human and Policy Dimensions*, 15(4), 338–352.
- Arlt, D., Hoppe, I., & Wolling, J. (2011). **Climate change and media usage: Effects on problem awareness and behavioural intentions**. *International Communication Gazette*, 73(1–2), 45–63.
- Benford, R. D., & Snow, D. A. (2000). Framing processes and social movements: An overview and assessment. *Annual Review of Sociology*, 26, 611–639.
- Bennett, W. L. (2011). *News: The politics of illusion* (9th ed.). London: Longman.
- Berglez, P. (2011). Inside, outside, and beyond media logic: Journalistic creativity in climate reporting. *Media, Culture & Society*, 33(3), 449–465.
- Billett, S. (2010). Dividing climate change: global warming in the Indian mass media. *Climatic change*, 99(1), 1–16.
- Boenker, K. (2012). *Communicating global climate change: Framing patterns in the US 24-hour news cycle* (Ph.D. Dissertation). University of Washington.

Frame Analysis in Climate Change Communication

Bowe, B. J., Oshita, T., Terracina-Hartman, C., & Chao, W.-C. (2014). Framing of climate change in newspaper coverage of the East Anglia e-mail scandal. *Public Understanding of Science*, 23(2), 157-169.

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

Brüggemann, M. (2014). Between frame setting and frame sending: How journalists contribute to news frames. *Communication Theory*, 24(1), 61-82.

Bruns, A. (2008). *The active audience: Transforming journalism from gatekeeping to gatewatching*. In C. Paterson & D. Domingo (Eds.), *Making online news: The ethnography of new media production* (pp. 171-184). New York: Peter Lang.

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

Cappella, J. N., & Jamieson, K. H. (1997). *Spiral of cynicism: The press and the public good*. New York: Oxford University Press.

Chetty, K., Devadas, V., & Fleming, J. S. (2015). The framing of climate change in New Zealand newspapers from June 2009 to June 2010. *Journal of the Royal Society of New Zealand*, 45(1), 1-20.

de Vreese, C. (2012). New avenues for framing research. *American Behavioural Scientist*, 56, 365-375.

de Vreese, C. H., & Boomgaarden, H. (2003). Valenced news frames and public support for the EU. *Communications*, 28, 361-381.

Detweiler, J. B., Bedell, B. T., Salovey, P., Pronin, E., & Rothman, A. J. (1999). Message framing and sunscreen use: Gain-framed messages motivate beach-goers. *Health Psychology*, 18(2), 189.

DiFrancesco, D.A., & Young, N. (2011). Seeing climate change: The visual construction of global warming in Canadian national print media. *Cultural Geographies*, 18, 517-536.

Dirikx, A., & Gelders, D. (2010a). **To frame is to explain: A deductive frame-analysis of Dutch and French climate change coverage during the annual UN Conferences of the Parties**. *Public Understanding of Science*, 19(6), 732-742.

Dirikx, A., & Gelders, D. (2010b). **Ideologies overruled? An explorative study of the link between ideology and climate change reporting in Dutch and French Newspapers**. *Environmental Communication—A Journal of Nature and Culture*, 4(2), 190-205.

Frame Analysis in Climate Change Communication

Doulton, H., & Brown, K. (2009). Ten years to prevent catastrophe? Discourses of climate change and international development in the UK press. *Global Environmental Change-Human and Policy Dimensions*, 19(2), 191-202.

Doyle, J. (2007). **Picturing the clima(c)tic: Greenpeace and the representational politics of climate change communication.** *Science as Culture*, 16(2), 129-150.

Doyle, J. (2009). Climate action and environmental activism. In T. Boyce & J. Lewis (Eds.), *Climate change and the media* (pp. 103-116). New York: Peter Lang.

Druckman, J. N. (2001) The implications of framing effects for citizen competence. *Political Behavior*, 23, 225-256.

Dunlap, R. E., & McCright, A. M. (2011). Organized climate change denial. In J. S. Dryzek, R. B. Norgaard, & D. Schlossberg (Eds.), *The Oxford handbook of climate change and society* (pp. 144-160). Oxford: Oxford University Press.

Durant, J. (Ed.). (1992). *Biotechnology in public: A review of recent research*. London: Science Museum.

Durant, J., Bauer, M. W., & Gaskell, G. (Eds.). (1998). *Biotechnology in the public sphere. A European sourcebook*. London: Science Museum.

Eide, E., Kunelius, R., & Kumpu, V. (Eds.). (2010). *Global climate—local journalisms*. Bochum, Germany: projektverlag.

Elgesem, D., Steskal, L., & Diakopoulos, N. (2015). Structure and content of the discourse on climate change in the blogosphere: The big picture. *Environmental Communication*, 9(2), 169-188.

Engesser, S. (2017, Forthcoming). The Impact of Journalistic Background, Professional Norms, and Culture on News Decisions Relative to Climate Change. In M. C. Nisbet, S. S. Ho, E. Markowitz, S. J. O'Neill, M. S. Schäfer, & J. Thaker (Eds.), *Oxford research encyclopedia on climate change communication*. New York: Oxford University Press.

Engesser, S., & Brüggemann, M. (2016). Mapping the minds of the mediators: The cognitive frames of climate journalists from five countries. *Public Understanding of Science*, 25(7), 825-841.

Entman, R. M. (1993). Framing: Towards clarification of a fractured paradigm. *Journal of Communication*, 43(4), 51-58.

Entman, R. M., Matthes, J., & Pellicano, L. (2009). Nature, sources, and effects of news framing. In K. Wahl-Jorgensen & T. Hanitzsch (Eds.). *The Handbook of Journalism Studies* (pp. 175-190). New York: Routledge.

Frame Analysis in Climate Change Communication

Fahmy, S. (2010). Contrasting visual frames of our times: A framing analysis of English- and Arabic language press coverage of war and terrorism. *International Communication Gazette*, 72, 695-717.

Ferree, M. M., Gamson, W. A., Gerhards, J., & Rucht, D. (2002). *Shaping abortion discourse. Democracy and the public sphere in Germany and the United States. Communication, society and politics*. Cambridge, U.K.: Cambridge University Press.

Flottum, K. (2017, Forthcoming). Linguistic Analysis Approaches for Assessing Climate Change Communication. In M. C. Nisbet, S. S. Ho, E. Markowitz, S. J. O'Neill, M. S. Schäfer, & J. Thaker (Eds.), *Oxford research encyclopedia on climate change communication*. New York: Oxford University Press.

Gamson, W. A. (1988). Political discourse and collective action. In B. Klandermans, H. Kriesi, & S. Tarrow (Eds.), *International social movement research. Vol. 1. A research annual. From structure to action: Comparing social movement research across cultures* (pp. 219-244). Greenwich, CT: JAI Press.

Gamson, W. A., & Modigliani, A. (1989). Media discourse and public opinion on nuclear power: A constructionist approach. *American Journal of Sociology*, 95(1), 1-37.

Gamson, W. A., & Wolfsfeld, G. (1993). Movements and media as interacting systems. *The Annals of the American Academy of Political and Social Science*, 528(1), 114-125.

Gan, F., Teo, J. L., & Detenber, B. H. (2005). Framing the battle for the White House A comparison of two national newspapers' coverage of the 2000 United States presidential election. *Gazette*, 67(5), 441-467.

Gerhards, J. (1995). Framing dimensions and framing strategies: Contrasting ideal- and real-type frames. *Social Science Information*, 34(2), 225-248.

Gerhards, J., & Schäfer, M. S. (2006). *Die Herstellung einer öffentlichen Hegemonie. Humangenomforschung in der deutschen und der US-amerikanischen Presse*. Wiesbaden, Germany: Verlag für Sozialwissenschaften.

Gibson, T. A. (2017, Forthcoming). Economic, Technological, and Organizational Factors Influencing News Coverage of Climate Change. In M. C. Nisbet, S. S. Ho, E. Markowitz, S. J. O'Neill, M. S. Schäfer, & J. Thaker (Eds.), *Oxford research encyclopedia on climate change communication*. New York: Oxford University Press.

Gitlin, T. (1980). *The whole world is watching*. Berkeley: University of California Press.

Goffman, E. (1986). *Frame analysis: An essay on the organization of experience*. Boston: Northeastern University Press.

Grabe, M. E. & Bucy, E. P. (2009). *Image bite politics: News and the visual framing of elections*. New York: Oxford University Press.

Frame Analysis in Climate Change Communication

Guardian. (2007). Full text: Ban-Ki moon speech. 12 December 2007. ***The Guardian / Environment***.

Gupta, J. (2010). **A history of international climate change policy**. *WIREs Climate Change*, 1(5), 636–653.

Hall, N. L., & Taplin, R. (2007). **Revolution or inch-by-inch? Campaign approaches on climate change by environmental groups**. *The Environmentalist*, 27(1), 95–107.

Hall, N. L., & Taplin, R. (2008). Room for climate advocates in a coal-focused economy? NGO influence on Australian climate policy. *Australian Journal of Social Issues*, 43, 359–379.

Hall, S. (1973). The determinations of news photographs. In S. Cohen & J. Young (Eds.), *The manufacture of news: deviance, social problems and the mass media* (pp. 176–190). London: Constable.

Hansen, A., & Machin, D. (2008). Visually branding the environment: Climate change as a marketing strategy *Discourse Studies*, 10, 777–794.

Hansen, A., & Machin, D. (2013). Researching visual environmental communication. *Environmental Communication*, 7(2), 151–168.

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

Hart, P. S., & Feldman, L. (2014). Threat without efficacy? Climate change on US network news. *Science Communication*, 36(3), 325–351.

Hertog, J. K., & McLeod, D. M. (2001). A multiperspectival approach to framing analysis: A field guide. In S. D. Reese, O. H. Gandy Jr., & A. E. Grant (Eds.), *Framing public life* (pp. 139–161). Mahwah, NJ: Lawrence Erlbaum Associates.

Hoffman, A. J. (2011). Talking past each other? Cultural framing of skeptical and convinced logics in the climate change debate. *Organization & Environment*, 24(1), 3–33.

Ihlen, Ø. (2009). Business and climate change: The climate response of the world's 30 largest corporations. *Environmental Communication: A Journal of Nature and Culture*, 3(2), 244–262.

Ihlen, Ø., & Nitz, M. (2008). Framing contests in environmental disputes: Paying attention to media and cultural master frames. *International Journal of Strategic Communication*, 2(1), 1–18.

Ivanova, A. (2017). *Transnationalisierung von Öffentlichkeiten. Eine länderübergreifende Längsschnittanalyse der Berichterstattung zum Klimawandel in führenden Tageszeitungen*. Wiesbaden, Germany: Verlag für Sozialwissenschaften.

Frame Analysis in Climate Change Communication

Ivanova, A., Schäfer, M. S., Schlichting, I., & Schmidt, A. (2013). Is there a medialization of climate science? Results from a survey of German climate scientists. *Science Communication*, 35(5), 626–653.

Iyengar, S. (1991). *Is anyone responsible? How television frames political issues*. Chicago: University of Chicago Press.

Iyengar, S. (1997). Framing responsibility for political issues. The case of poverty. In S. Iyengar & R. Reeves (Eds.), *Do the media govern? Politicians, voters and reporters in America* (pp. 276–282). London: SAGE.

Jun, J. (2011). **How climate change organizations utilize websites for public relations**. *Public Relations Review*, 37(3), 245–249.

Kenix, L. J. (2008). Framing science: Climate change in the mainstream and alternative news of New Zealand. *Political Science*, 60(1), 117–132.

Kirilenko, A., & Stepchenkova, S. (2012). Climate change discourse in mass media: Application of computer-assisted content analysis. *Journal of Environmental Studies and Sciences*, 2(2), 178–191.

Kirilenko, A. P., & Stepchenkova, S. O. (2014). Public microblogging on climate change: One year of Twitter worldwide. *Global Environmental Change*, 26, 171–182.

Kohring, M., & Matthes, J. (2002). The face(t)s of biotech in the nineties: How the German press framed modern biotechnology. *Public Understanding of Science*, 11(2), 143–154.

König, T. (2013). Frame analysis. Retrieved from <http://www.ccsr.ac.uk/methods/publications/frameanalysis/index.html>

Koteyko, N., & Atanasova, D. (2017, Forthcoming). Discourse Analysis Approaches for Assessing Climate Change Communication and Media Portrayals. In M. C. Nisbet, S. S. Ho, E. Markowitz, S. J. O'Neill, M. S. Schäfer, & J. Thaker (Eds.), *Oxford research encyclopedia on climate change communication*. New York: Oxford University Press.

Koteyko, N., Thelwall, M., & Nerlich, B. (2010). From carbon markets to carbon morality: Creative compounds as framing devices in online discourses on climate change mitigation. *Science Communication*, 32(1), 25–54.

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

Levy, D., & Newman, N. (2014). *Reuters Institute News Report 2014*. Oxford: University of Oxford.

Liu, X., Lindquist, E., & Vedlitz, A. (2011). **Explaining media and congressional attention to global climate change, 1969–2005: An empirical test of agenda-setting theory**. *Political Research Quarterly*, 64(2), 405–419.

Frame Analysis in Climate Change Communication

Lück, J., Wessler, H., Wozniak, A., & Lycarião, D. (2016, Forthcoming).

Counterbalancing global media frames with nationally colored narratives: A comparative study of news narratives and news framing in the climate change coverage of five countries. *Journalism*.

Lück, J., Wozniak, A., & Wessler, H. (2016). Networks of coproduction: How journalists and environmental NGOs create common interpretations of the UN climate change conferences. *The International Journal of Press/Politics*, 21(1), 25–47.

Matthes, J. (2007). *Framing-Effekte. Zum Einfluss der Politikberichterstattung auf die Einstellungen der Rezipienten*. Munich: Reinhard Fischer.

Matthes, J. (2009). What's in a frame? A content analysis of media framing studies in the world's leading communication journals, 1990–2005. *Journalism & Mass Communication Quarterly*, 86(2), 349–367.

Matthes, J. (2014). *Framing*. Baden-Baden: Nomos.

Matthes, J., & Kohring, M. (2004). Die empirische Erfassung von Medien-Frames. *Medien & Kommunikationswissenschaft*, 52(1), 56–75.

Matthes, J., & Kohring, M. (2008). **The content analysis of media frames: Toward improving reliability and validity.** *Journal of Communication*, 58(2), 258–279.

McAdam, D., & Snow, D. A. (1997). Interpretative factors: Framing processes. In D. McAdam & D. A. Snow (Eds.), *Social movements* (pp. 232–234). Los Angeles: Roxbury.

McCright, A. M., & Dunlap, R. E. (2003). Defeating Kyoto: The conservative movement's impact on US climate change policy. *Social Problems*, 50(3), 348–373.

Messaris, P., & Abraham, L. (2001). The role of images in framing news stories. In S. D. Reese, O. H. J., Gandy, & A. E. Grant (Eds.), *Framing public life* (pp. 215–226). Mahwah, NJ: Taylor & Francis.

Metag J. (2017, Forthcoming). Content Analysis Methods for Assessing Climate Change Communication and Media Portrayals. In M. C. Nisbet, S. S. Ho, E. Markowitz, S. J. O'Neill, M. S. Schäfer, & J. Thaker (Eds.), *Oxford research encyclopedia on climate change communication*. New York: Oxford University Press.

Metag, J., Schäfer, M. S., Fuchsli, T., Barsuhn, T., & Small-of Königslöw, C. (2016). Perceptions of climate change imagery: Evoked salience and self-efficacy in Germany, Switzerland and Austria. *Science Communication*, 38, 197–227.

Miller, M. (1997). Frame mapping and analysis of news coverage of contentious issues. *Social Science Computer Review*, 15, 367–378.

Frame Analysis in Climate Change Communication

Miller, M. M., & Riechert, B. P. (2001). Frame mapping: A quantitative method for investigating issues in the public sphere. In M. D. West (Ed.), *Applications of computer content analysis* (pp. 61–75). Westport, CT: Ablex.

Moser, S. C. (2010). Communicating climate change: History, challenges, process and future directions. *WIREs Climate Change*, 1, 31–53.

Newell, P. J. (2000). *Climate for change: Non-state actors and the global politics of the greenhouse*. Cambridge, U.K.: Cambridge University Press.

Nisbet, M. C. (2009). Communicating climate change: Why frames matter for public engagement. *Environment*, 51(2), 12–23.

Nisbet, M. C. (2009). Knowledge into Action: Framing the Debates Over Climate Change and Poverty. In P. D'Angelo & J. Kuypers (Eds.), *Doing News Framing Analysis: Empirical, Theoretical, and Normative Perspectives* (pp. 43–83). New York: Routledge.

Nisbet, M. C., & Kotcher, J. E. (2009). **A two-step flow of influence? Opinion-leader campaigns on climate change**. *Science Communication*, 30(3), 328–354.

Nivas, G. P., Arul, C., & Aram, A. (2016). Framing of climate change issues in Indian television news channels. *Journal of Media and Communication Studies*, 8(4), 31.

Nwabueze, C., & Egbra, S. (2016). Newspaper framing of climate change in Nigeria and Ghana. *Applied Environmental Education & Communication*, 15(2), 111–124.

Olausson, U. (2009). Global warming—global responsibility? Media frames of collective action and scientific certainty. *Public Understanding of Science*, 18(4), 421–436.

Olausson, U., & Berglez, P. (2014). Media and climate change: Four long-standing research challenges revisited. *Environmental Communication*, 8, 249–265.

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

O'Neill, S., Boykoff, M., Day, S., & Niemeyer, S. (2013). On the use of imagery for climate change engagement. *Global Environmental Change*, 23, 413–421.

O'Neill, S. J., & Smith, N. (2014). Climate change and visual imagery. *Wiley Interdisciplinary Reviews: Climate Change*, 5(1), 73–87.

O'Neill, S., Williams, H. T. P., Kurz, T., Wiersma, B., & Boykoff, M. (2015). Dominant frames in legacy and social media coverage of the IPCC Fifth Assessment Report. *Nature Climate Change*, 5(4), 380–385.

Painter, J. (2013). *Climate change in the media: Reporting risk and uncertainty*. Oxford: Tauris.

Frame Analysis in Climate Change Communication

Painter, J. (2014). *Disaster Averted? Television Coverage of the 2013/14 IPCC's Climate Change Reports*. Oxford, England: Reuters Institute for the Study of Journalism.

Painter, J., & Ashe, T. (2012). Cross-national comparison of the presence of climate scepticism in the print media in six countries, 2007–10. *Environmental Research Letters*, 7(4), 044005.

Painter, J., Erviti, M. C., Fletcher, R., Howarth, C., Kristiansen, S., Leon, B., et al. (2016). *Something old, something new: Digital media and the coverage of climate change*. Oxford: Reuters Institute for the Study of Journalism.

Painter, J., & Schäfer, M. S. (2017, Forthcoming). Global similarities and persistent differences: A survey of comparative studies on climate change communication. In B. Brevini & J. Lewis (Eds.), *Climate change in the media*. New York: Peter Lang.

Pan, Z., & Kosicki, G. M. (1993). Framing analysis: An approach to news discourse. *Political Communication*, 10, 55–75.

Pearce, W., Holmberg, K., Hellsten, I., & Nerlich, B. (2014). Climate change on Twitter: Topics, communities and conversations about the 2013 IPCC Working Group 1 report. *PloS one*, 9(4), e94785.

Post, S. (2014). **Communicating science in public controversies: Strategic considerations of the German climate scientists**. *Public Understanding of Science*, 25(1), 61–70.

Potthoff, M. (2012). *Medien-Frames und ihre Entstehung*. Wiesbaden, Germany: Springer

Rebich-Hespanha, S., Rice, R. E., Montello, D. R., Retzlöff, S., Tien, S., & Hespanha, J. P. (2015) Image Themes and Frames in US print news stories about climate change. *Environmental Communication*, 9, 491–519.

Rodriguez, L., & Dimitrova, D. V. (2011). The levels of visual framing. *Journal of Visual Literacy*, 30, 48–65.

Roosvall, A., & Tegelberg, M. (2013). Framing climate change and indigenous peoples: Intermediaries of urgency, spirituality and de-nationalization. *International Communication Gazette*, 75(4), 392–409.

Sampei, Y., & Aoyagi-Usui, M. (2009). Mass-media coverage, its influence on public awareness of climate-change issues, and implications for Japan's national campaign to reduce greenhouse gas emissions. *Global Environmental Change*, 19(2), 203–212.

Schäfer, M. S. (2007). *Wissenschaft in den Medien. Die Medialisierung naturwissenschaftlicher Themen*. Wiesbaden, Germany: Verlag für Sozialwissenschaften.

Schäfer, M. S. (2009). From public understanding to public engagement: An empirical assessment of changes in science coverage. *Science Communication*, 30(4), 475–505.

Frame Analysis in Climate Change Communication

Schäfer, M. S. (2015). Climate change in the media. In J. D. Wright (Ed.), *International encyclopedia of the social & behavioral sciences* (2d. ed., Vol. 3., pp. 853–859). Oxford: Elsevier.

Schäfer, M. S. (2017, Forthcoming). Climate change communication in Germany. In M. C. Nisbet, S. S. Ho, E. Markowitz, S. J. O'Neill, M. S. Schäfer, & J. Thaker (Eds.), *Oxford research encyclopedia on climate change communication*. New York: Oxford University Press.

Schäfer, M., Berglez, P., Wessler, H., Eide, E., Nerlich, B., & O'Neill, S. (2016). Investigating mediated climate change communication: A best-practice guide. Available online <http://www.diva-portal.org/smash/record.jsf?pid=diva2%3A961854&dswid=-949#sthash.NKELFxOY.dpbs>

Schäfer, M. S., & Schlichting, I. (2014). **Media representations of climate change: A meta-analysis of the research field.** *Environmental Communication: A Journal of Nature and Culture*, 8(2), 142–160.

Scheufele, B. (2000). “Scattered” or related—clarifying the framing concept by integrating related approaches? In H.-B. Brosius (Ed.), *Kommunikation über Grenzen und Kulturen* (pp. 281–396). Konstanz, Germany: UVK Medien.

Scheufele, B. (2003). *Frames—Framing—Framing-Effekte: Theoretische und methodische Grundlegung des Framing-Ansatzes sowie empirische Befunde zur Nachrichtenproduktion. Studien zur Kommunikationswissenschaft*. Opladen, Germany: Westdeutscher Verlag.

Scheufele, D. A. (1999). Framing as a theory of media effects. *Journal of Communication*, 49(1), 103–122.

Schlichting, I. (2012). Framing-Strategien in der Klimakommunikation von Industrieakteuren. In I. Neverla & M. Schäfer (Eds.), *Das Medien-Klima* (pp. 47–68). Wiesbaden: Springer VS.

Schlichting, I. (2013). **Strategic framing of climate change by industry actors: A meta-analysis.** *Environmental Communication: A Journal of Nature and Culture*, 7(4), 493–511.

Schmidt, A. (2012). Bewegungen, Gegenbewegungen, NGOs: Klimakommunikation zivilgesellschaftlicher Akteure. In I. Neverla & M. S. Schäfer (Eds.), *Das Medien-Klima* (pp. 69–94). Wiesbaden, Germany: Springer.

Scholte, S., Vasileiadou, E., & Petersen, A. C. (2013). Opening up the societal debate on climate engineering: how newspaper frames are changing. *Journal of Integrative Environmental Sciences*, 10(1), 1–16.

Frame Analysis in Climate Change Communication

Schroeder, M. (2008). The construction of China's climate politics: Transnational NGOs and the spiral model of international relations. *Cambridge Review of International Affairs*, 21(4), 505-525.

Schultz, D. P., & Schultz, S. E. (2015). *A history of modern psychology*. Boston: Cengage Learning.

Semetko, H. A., & Valkenburg, P. M. (2000). Framing European politics: A content analysis of press and television news. *Journal of Communication*, 50, 93-109.

Shehata, A., & Hopmann, D. (2012). Framing climate change: A study of US and Swedish press coverage of global warming. *Journalism Studies*, 13, 175-192.

Shoemaker, P. J., & Reese, S. D. (1995). *Mediating the message: Theories of influence on mass media content* (2d ed.). New York: Longman.

Smith, N., & Joffe, H. (2009) Climate change in the British press: The role of the visual. *Journal of Risk Research*, 12, 647-663.

Stamm, K. R., Clark, F., & Eblacas, P. R. (2000). Mass communication and public understanding of environmental problems: The case of global warming. *Public Understanding of Science*, 9(3), 219-237.

Taddicken, M. (2013). Climate change from the user's perspective: The impact of mass media and internet use and individual and moderating variables on knowledge and attitudes. *Journal of Media Psychology*, 25(1), 39-52.

Takahashi, B. (2011). **Framing and sources: A study of mass media coverage of climate change in Peru during the V ALCUE**. *Public Understanding of Science*, 20(4), 543-557.

Takahashi, B., & Meisner, M. (2012). **Climate change in Peruvian newspapers: The role of foreign voices in a context of vulnerability**. *Public Understanding of Science*, 22(4), 427-442.

Tankard, J. W. (2001). The empirical approach to the study of media framing. In S. D. Reese, O. H. Gandy Jr., & A. E. Grant (Eds.), *Framing public life* (pp. 95-106). Mahwah, NJ: Lawrence Erlbaum Associates.

Trumbo, C. (1996). **Constructing climate change: claims and frames in US news coverage of an environmental issue**. *Public Understanding of Science*, 5(3), 269-283

Tynkkynen, N. (2010). A great ecological power in global climate policy? Framing climate change as a policy problem in Russian public discussion. *Environmental Politics*, 19(2), 179-195.

Urry, J. (1992). The tourist gaze "revisited." *American Behavioural Scientist*, 36, 172-186.

Frame Analysis in Climate Change Communication

Weingart, P., Engels, A., & Pansegrau, P. (2000). Risks of communication: Discourses on climate change in science, politics, and the mass media. *Public Understanding of Science*, 9(3), 261–283.

Weingart, P., Engels, A., & Pansegrau, P. (2002). *Von der Hypothese zur Katastrophe. Der anthropogene Klimawandel im Diskurs zwischen Wissenschaft, Politik und Massenmedien*. Opladen, Germany: Leske + Budrich.

Wessler, H. W., Wozniak, A., Hofer, L. H., & Luck, J. L. (2016). Global multimodal news frames on climate change: A comparison of five democracies around the world. *The International Journal of Press/Politics*, 21, 423–445

Wozniak, A., Lück, J., & Wessler, H. (2015). Frames, stories, and images: The advantages of a multimodal approach in comparative media content research on climate change. *Environmental Communication*, 9(4), 469–490.

Wozniak, A., Wessler, H., & Lück, J. (2016). Who prevails in the visual framing contest about the United Nations Climate Change Conferences? *Journalism Studies*, 1–20.

Yun, S.-J., Ku, D., & Han, J. (2014). Framing climate change as an economic opportunity in South Korean newspapers. *Development and Society*, 43(2), 219–238.

Mike S. Schäfer

University of Zurich

Saffron O'Neill

University of Exeter

