Author Accepted Manuscript

To cite this article:
Sonia Parratt-Fernández, María-Ángeles Chaparro-Domínguez & Gregory S. Gilbert (2022) Discursive Strategies for Climate Change Reporting: A Case Study of *The Mercury News*, *Environmental Communication*, 16:4, 505-519, DOI: 10.1080/17524032.2022.2048043

Discursive strategies for climate change reporting: a case study of *The Mercury News*

Sonia Parratt-Fernández, María-Ángeles Chaparro-Domínguez and Gregory S. Gilbert

Abstract

This paper examines how journalists use discursive strategies when covering the complex issue of climate change in *The Mercury News*, a large regional U.S.A. newspaper in California, a state deeply impacted by this problem. Quantitative content analysis of published texts and semi-structured interviews of journalists uncovered common use of formative discursive elements and the principles of constructive journalism, consistent with the journalists' expressed priorities to help educate readers and make climate change interesting, relevant, and easily readable. The demands for speedy reporting in the digital environment and cuts to newsroom staff affect the use of discursive strategies for climate change coverage and limits opportunities for journalists to specialize. Journalists noted the challenge of conveying topics that are abstract, technical, and embedded with uncertainty to readers who demand definitive and instantaneous information. Such challenges are accentuated by poor connections between academic experts on climate change and the public and the press.

1. Introduction

Since the 1990s, the climate crisis has taken center stage in media coverage of environmental issues in Western countries. Unsurprisingly, academic interest in how climate change issues are reported in the press has also grown, because we are at a key moment for society to find pathways for change. This interest has produced numerous papers (e.g., Boykoff & Rajan, 2007; Schäfer et al. 2014; Boykoff & Luedecke, 2016; Schmid-Petri et al., 2017; Norton & Hulme, 2019; Song, et al., 2021), mostly either diachronic analyses of the evolution of coverage over extended periods of time or research that focuses on key moments, such as the Conference of the Parties (COP) and the publication of the Intergovernmental Panel on Climate Change (IPCC) reports.

Here we take a case study approach focused on climate change coverage in *The Mercury News*, the largest regional newspaper in California, the most populous state in the U.S.A. This newspaper is California's second in readership (Agility PR Solutions, 2021). Established in 1851 during the California gold rush, it later became a pioneer in

delivering news online; it has five times won EPPY awards for its on-line news coverage. California has been especially impacted by climate change because of its large, coastal population, its status as the largest agricultural production in the country, its reliance on water imported from other states during a decades-long drought period, and the impacts of sea-level rise and monumental wildfires exacerbated by climate change. As a result, California newspapers have a large responsibility to help state residents confront the problems of climate change. While there have been several studies of climate change coverage in large national newspapers such as *The New York Times*, The *Washington Post*, *USA Today* and *The Wall Street Journal* (Duan et al., 2017; Feldman et al., 2017; Mazur, 2019; Church et al., 2020; Morris, 2021), those newspapers do not have the same regional connections and obligations as one like *The Mercury News*. *The Mercury News* has the responsibility to make connections for readers between daily, personal impacts and what is happening at the global scale. In addition, two of their journalists won prestigious prizes for environmental reporting in 2015 and 2016[1].

This study adds a new dimension to previous research by examining the use of discursive strategies that, according to the scientific literature, could be part of more effective climate change communication. Among these strategies are constructive journalism and formative elements associated with the educational role of the media. We examine patterns of use of these strategies in media coverage of climate change, and then explore how journalists' use of the strategies is shaped by their professional constraints and contexts and their perceptions of the values of the strategies.

2. Literature review

Constructive journalism

The digital scene of the 2010s created a changing professional context that required a redefined sense of the public service function of journalism, including a vision of constructive journalism where journalists are not only responsible for the quality of the news, but also for its impact on individuals and society (From & Nørgaard, 2018; Hermans & Drok, 2018). Indebted to both "public journalism, peace journalism, and activist journalism" (Aitamurto & Varma, 2018) and civic journalism (Hermans & Drok, 2018), constructive journalism borrows resources from service journalism, including offering guidance to navigate an increasingly complex world. It is sometimes called 'solutions journalism' because it seeks to create a positive social impact by reporting on problems and suggesting how to solve them both in local and global contexts (Haagerup, 2014; Aitamurto & Varma, 2018). This journalistic approach also has its critics, worried that an overly public-oriented approach can evolve into populism and that a focus on problem-solving is akin to activism; this violates the professional journalistic values of objectivity and autonomy. Similarly, the avoidance of negativity and focus on consensus in the solutions-based approach could "turn journalism into a good-news-show that

[1] They were awarded Columbia University's Oakes Award for Distinguished Environmental Journalism and Scripps Howard's Edward J. Meeman Award for Environmental Reporting for their coverage of the California drought in 2015, and "Best of The West" in Growth and Environment Reporting in 2016.

limits the attention for what is going wrong in the world and the exposure of abuse of power" (Hermans & Drok, 2018).

Constructive journalism is usually associated with political and social issues (From & Nørgaard, 2018) rather than scientific ones, which may be why its use to communicate environmental phenomena such as the climate crisis has not yet been the subject of detailed study. Some research has touched tangentially on constructive journalism in climate change, including recommending that the media can help empower the public to combat climate change by raising awareness about the impacts of individual actions (Norgaard, 2011; Roeser, 2012), and by taking public opinion into account (Moser & Diddling, 2012). There have been limited explorations of positive and solution-based reporting on social change by activists (Ciszek, 2018), and optimistic, solution-oriented reporting on sustainability (Haagerup, 2014; Atanasova, 2019; McCarthy, 2019).

Hermans & Drok (2018) recommend practical strategies for journalists to incorporate elements of constructive journalism into their routines. They suggest that professionals should be *public-oriented* by asking people about the social issues and problems they want to see addressed; s*olution-oriented* by going beyond informing about problems; a*ction-oriented* by empowering people to change their world for the better; and *future-oriented* by looking further than breaking news. Pope and Hertsgaard (2019) concur with the latter point, noting that climate change is a multidimensional problem of such scope that it must connect to many other issues, and with McCarthy (2019), for whom "climate is part of our everyday life and must be part of every story".

Educational role

The role of scientific journalists has changed substantially as the online press has taken over from print media in recent decades. Beyond the traditional informative task of transmitting scientific information to the public, journalists have also acquired a role as civic educators (Fahy & Nisbet, 2011), on which Fernández-Reyes (2011) reflects in relation to environmental journalism:

> In the debate on whether the formative or educational function is a characteristic of Environmental Journalism, I opt for the idea that the formative function is embedded in the informative one. [...] I am in an intermediate position, proposing that we are not educators; but in the exercise of journalism, the news has an educative element as a basic function, an intrinsic tool that enriches the journalistic story.

Following Fernández-Reyes, Parratt et al. (2021) argue that, in order to bring the complexity of the climate phenomenon closer to society, the media have a fundamental educational function. They analyze the presence in the digital press of what they call 'formative elements' which, in their opinion, not only explain the problem to readers, but also point readers to how they can contribute individually to solutions. These formative elements comprise definitions and explanations of subjects related to climate change, translating technical or unfamiliar terms into more accessible language (Parratt, 2009; Hansen, 2010; Jones & Peterson, 2017), contextualization explaining causes and/or effects, guidelines of how to mitigate or adapt to climate change in everyday life, and the use of visual resources to communicate all of this.

Many authors highlight the importance of such visual resources – photographs, infographics and, increasingly, videos – in climate change-related news stories (e.g., Kollmuss & Agyeman, 2002; Smith & Joffe, 2009; Leon & Erviti, 2016; O'Neill, 2017; Viteri & Takahashi, 2020). Much of the content of these stories is "visual, multimedia, interactive, employing a multiplicity of tools to immerse readers in the enormity of the issue" (Blanding, 2020), and visuals often convey the impacts, rather than causes or solutions of climate change (Rebich-Hespanha et al., 2014; Metag et al., 2016; Wang et al., 2018). Whether visuals help readers understand climate change or help guide them to individual actions has not been examined, although there are some recommendations from outside of academia about spurring to action (Climate Outreach, n.d.).

Formative elements largely condense and coincide with the principles of constructive journalism and with tips for better coverage of the climate crisis proposed by Painter and Osaka (2019, 2020): focus on relevance to audience's everyday life, include environmental coverage across all areas of reporting beats, emphasize potential solutions, highlight visual and multimodal reporting, and make connections to the local.

Other strategies for climate change communication

In addition to constructive journalism and formative elements, several studies propose other strategies to improve media coverage of climate change. One suggested mode is exemplification, which helps reduce complex phenomena to the concrete, specific occurrences that characterize them (Zillmann, 2002). The theory of exemplification states that underlying facts reach the public much more effectively through apposite case studies than through presentation of abstract or unengaging data (Andersen et al., 2017; Grabe et al., 2017). There has been scant analysis of whether the increasing use of these strategies better capture press readers' attention (Andersen et al., 2017 in the United States and Bachmann & Mujica, 2019 in Chile), and no such analysis with respect to climate change.

More common are analyses of the use of metaphors, which are "implied comparisons between two dissimilar objects that make you experience one thing in terms of another and they can help generate new insights and make complex concepts more meaningful" (van der Linden et al., 2014, p. 256). Climate change may be particularly generative of novel metaphors because, compared to other environmental problems, it has been challenging to bridge scientific and lay understanding (Ungar, 2000). Additionally, extensive and extended media coverage "may create pressure for journalists to find novel ways of presenting the issue" (Woods et al., 2012). Researchers disagree on the utility of metaphors in scientific communication in general (Ervas et al., 2017) and on climate change in particular (among others, Niebert & Gropengiesser, 2013; Woods et al., 2012; van der Linden et al., 2014).

On the other hand, the recommendation that scientific journalists adapt their reporting "in ways that link them to more salient (local) issues people consistently care about – the economy, their children, their health and safety" (Moser & Diddling, 2011, p. 165) is not consistently followed. The media often portray climate change as a culturally and geographically distant process, with little or no influence on people's lives, and coverage is often linked to news hooks such as global meetings or international reports (Carvalho & Burgess, 2005; Fernández-Reyes, 2018). Accordingly, since science and evidence are

usually framed at the national and international levels, impacts and responses to climate change are therefore misaligned with needs at the local level (Howarth & Painter, 2016), which creates a gap for local media to fill (Howarth & Anderson, 2019). In recent years, there has been some engagement at the local level: coverage by some European media of COP21 was specifically linked to local problems (León, 2015) as was the role of a local newspaper in shaping public debate over the implementation of a climate adaptation plan in a coastal region of Australia (Bowden, Nyberg & Wright, 2021). In California, expensive action-oriented information was provided the Californian press as part of coverage of wildfires and floods in the area; both were indirectly related to climate change.

Journalists face the task of providing public access and understanding of complex scientific ideas, complex social and economic consequences with significant uncertainties, and complex social, political, and economic opportunities for solutions. However, the magnitude and consequences of climate change issues are immense and of a kind of complexity and urgency that can lead to despair among readers. This creates a shift in responsibilities of the journalists that requires them to reconsider which discursive strategies are most effective to meet those responsibilities. The choices they make affect how climate change is communicated. These shifts motivate us to examine discursive strategies such as constructive journalism, formative elements, and the modalities of exemplification, metaphors, and local angle in climate change journalism. We do so through content analysis of texts from *The Mercury* News, guided by a series of variables recognized as associated with the different discursive strategies (Methods, Table 1).

Professional constraints and contexts

Professional constraints and contexts can also affect which discursive strategies journalists choose. Financial difficulties experienced by many media companies have led to an excessive reliance on content from news agencies for coverage of climate change issues, a pattern noted in such different countries as Peru (Takahashi & Meisner, 2013) and the United States (Lewis et al., 2008), as well as in comparative studies among various countries (Arcila et al., 2015). In addition, those same financial constraints force many journalists to work as generalists, so that those covering climate change issues may lack specialized training in environmental journalism (Boykoff & Rajan, 2007; Parratt, 2014). Painter (2016) describes this situation:

> […] the digital revolutions have added pressure on the journalists who remain. There has been a significant enlargement in their scope of duties, in the amount they have to produce, and in the variety of platforms they are expected to produce material on. Technical and computing skills are increasingly required, as well as more interaction with the (digital) audience. These extra demands on journalists and the numerical decline of specialist environment beats in many legacy media have raised questions about the provision of reliable information about the environment to the public. (p. 10)

Some papers draw attention to other journalistic shortcomings and offer clues to remedies. One shortcoming is the tendency to report more on immediate current events than on the longer-term processes and broader contexts through which environmental

issues are often interconnected (Hansen, 2011; Dernbach, 2012). Brüggemann & Engesser (2017) question whether the traditional model of purely informative journalism can effectively convey a complex phenomenon such as climate change, and highlight the need for more explanation and contextual information. In doing so, they align themselves with the theory of informative and explanatory communication (Rowan, 2003), which posits that the informative discourse of breaking news should be reinforced by the discourse of more interpretative texts. In some cases, these discourses arise directly from their connection to the breaking news; in others, they deal with topics that journalists deem important to examine in greater depth, even without a specific news hook as justification. Also, Howarth & Anderson (2019) suggest that scientists could be more active in increasing local salience of climate change by building trusted relationships with local media.

Our study has two objectives. Firstly, to examine the use of discursive strategies that, according to the scientific literature, contribute to better communication of climate change. Secondly, to understand journalists' perceptions of the use of these strategies and how professional constraints can affect their use. The research questions, explored through a case study of the U.S. newspaper *The Mercury News*, are the following:

> **RQ1**: *What discursive strategies are used in climate change coverage in a regional newspaper like The Mercury News?*
> **RQ2**: *What do environmental journalists of The Mercury News think about using discursive strategies to improve coverage of the climate crisis?*
> **RQ3:** *What constraints and contexts do the environmental journalists of The Mercury News think affect the use of discursive strategies in climate change coverage?*

3. Methods

This research employed a case study approach focused on *The Mercury News*. It revolves around the discursive strategies present in texts directly or indirectly related to the climate crisis, and to the perceptions their authors have of their use and of professional constraints. It does not intend to evaluate their effectiveness, which has already been examined elsewhere in the scientific literature. To this end, we used a multimethod research approach: (1) a quantitative content analysis to answer the first research question and (2) the qualitative technique of semi-structured interviews for the second and third.

Content analysis

First, we searched the digital archive of *The Mercury News* for all the articles published in any section of the online version of the newspaper, which had the label 'climate change' and were published between January 1 and December 31, 2020. Unlike diachronic studies that select certain dates of each year to know how the coverage has evolved, here we choose to analyze a whole year to include periods of greater and less informative production, and thus make a more complete study. The tag 'climate change' allowed us to identify texts that explicitly talk about climate change as well as others less directly related but which are, as Pope and Hertsgaard (2019) and McCarthy (2019) state, equally relevant. The search was completed by finding the concepts 'global

warming', 'climate crisis' and 'greenhouse effect' in the content of the pieces. In total, 162 texts were located, from which sponsored content, repeated texts, letters to the editor and opinion texts were discarded. After this filtering process, we obtained 114 pieces, which are our units of analysis.

The codebook contains a total of 47 variables that help distinguish among the primary discursive strategies including the "formative elements" by Parratt et al. (2021), and the strategies proposed by Hermans & Drok (2018) for incorporating constructive elements, in addition to exemplifications, metaphors, and local angle. To analyze each text, each variable was scored with a binary "yes" or "no" depending on whether that modality was detected. The variables in the codebook are summarized in Table 1:

Table 1.
Main variables in the codebook for content analysis, and the justification in the literature for their use as indicators of the different discursive strategies described in the Literature Review.

Codebook variable	Literature sources
Type of text (informative or interpretative)	Rowan, 2013; Brüggemann & Engesser, 2017
Direct references to climate change or related concepts	Parratt et al., 2021
Definitions and/or explanations of related concepts	Hansen, 2010; Jones & Peterson, 2017; Parratt et al., 2021
Comparisons, metaphors and/or other devices of speech	Woods, Fernández & Coen, 2012; Niebert & Gropengiesser, 2013; van der Linden et al., 2014; Ervas, Gola & Rossi, 2017
Direct or indirect causes of climate change	Hansen, 2010; Jones & Peterson, 2017; Parratt et al., 2021
Examples of consequences and/or effects of climate change	Zillmann, 2002; Hansen, 2010; Jones & Peterson, 2017; Andersen et al., 2017; Grabe et al., 2017
Calls to companies and/or governments to act in the face of climate change	Parratt et al., 2021
Guidance to the reader on how to act in the face of climate change	Climate Outreach (n.d.); Painter & Osaka, 2019, 2020
Personalized or appellative language	Hermans & Drok, 2018
Local or proximity approach	Moser & Diddling, 2011; Painter & Osaka, 2019, 2020
Positive approach	Hermans & Drok, 2018

Coding was carried out by two of the study authors after a pre-test in which disagreements were resolved by coders working to reach consensus. Cohen's Kappa coefficient was used to measure the degree of agreement between coders in a sample of 20% of the pieces. We achieved Kappa ≥ 0.8 (0 indicates no agreement and 1 complete agreement) in all tests and across all variables, indicating very good agreement between coders, and a concordance acceptable for the study.

Descriptive statistical analyses were performed on the extracted data, followed by examining dependency in the relationships between variables using Pearson's Chi-square test. The SPSS statistical analysis software (version 25) was used for this purpose.

Interviews with journalists

We complemented the quantitative analysis using semi-structured interviews with journalists from *The Mercury News* who cover themes related to climate change, exploring their perceptions about the discursive strategies they use in writing their texts and about professional constraints and contexts that may affect such use. We interviewed the two staff journalists who specialize in environmental issues at the paper and complemented those interviews with third professional who occasionally covers environmental issues. The three range in experience and professional histories: two hold degrees in journalism and one of them has taught science writing at the university level, but neither have any formal training in environmental journalism. The third journalist was originally trained as a biologist. Each of the journalists authored pieces included in the content analysis. The interviews were conducted in June 2021 through Zoom due to the COVID-19 situation, and they lasted between 20 and 70 minutes. All interviews were recorded and auto transcribed via YuJa software (yuja.com); transcripts were then manually edited by one of the authors while watching the videos to have more precise transcriptions, and finally organized for analysis.

We asked several open questions concerning interviewees' training and entry into the profession, as well as their opinions about their roles in society as journalists. Our interviews also included questions about the strategies they use to engage readers when writing stories related to climate change, their impressions about choosing a constructive approach, and their vision of the challenges they face as environmental reporters. During the conversations, some of the stories that had been examined in our content analysis were discussed. After the interviews were complete, we analyzed the responses in the context of thematic patterns detected in the content analysis phase.

The human subjects research protocols were reviewed and approved by the University of California Santa Cruz Office of Research Compliance Administration (US DHHS Registration Number IRB00000266) for UCSC IRB Protocol #3958 as meeting the criteria for exemption under 45 CFR 46.104 (approval 27 April 2021).

3. Results and discussion

The first part of this section presents the results of the content analysis of the stories related to climate change in *The Mercury News*, the second presents the analysis of the semi-structured interviews to some of the journalists who wrote the stories.

3.1. Content analysis

A little over a third of the pieces analyzed (34.2%) were written by journalists from *The Mercury News*, while the remaining two thirds (65.8%) come from news agencies such as The Associated Press or Reuters. The reliance on agency-provided content may be due to financial constraints common in the industry (Lewis et al., 2008; Takahashi & Meisner, 2013; Arcila et al., 2015). Because agency texts are often designed to be purely informative (89.3% of the agency texts were classified as informative), it is then not

surprising that 78.1% of all the examined texts were informative, with only 21.9% interpretive. This is consistent with concerns about the excessive use of informative pieces (Rowan, 2003; Brüggemann & Engesser, 2017) and recommended need for "providing more than breaking news and looking further than the events of the day" (Hermans & Drok, 2018). In addition, texts from journalists at *The Mercury News* were more than twice as likely as texts from agencies to have a local focus (69.2% vs. 33.3, respectively; Table 2).

Direct references to climate change or related concepts – such as climate crisis, global warming, or the greenhouse effect – are found in almost two thirds (64.9%) of the analyzed content (Table 2). Two conclusions can be drawn from this. First, the newspaper includes under the label 'climate change' a considerable number of texts (35.1%) that do not discuss climate change directly, but instead focus on related topics. This highlights how climate change is seen as a multidimensional problem that is intrinsic to other topics (Pope & Hertsgaard, 2019), and that it is "part of our everyday life and must be part of every story" (McCarthy, 2019). At the same time, however, it is possible that the reader may not perceive this connection to climate change at all, because the term is not mentioned in the text – only as a label at the end of the story.

Table 2.
Presence of main discursive strategies used in analyzed texts related to climate change in The Mercury News (n=114)

		Comparison by source of text		
Discursive strategy	**% used overall**	**% by TMN**	**% by News agencies**	**χ^2 (P value)**
Direct references to climate change	64.9	89.7	52.0	16.0 (0.000)
Definitions and/or explanations	46.5	56.4	41.3	2.3 (0.126)
Comparisons or other rhetorical devices	33.3	25.6	37.3	1.6 (0.209)
Causes	50.9	66.7	42.7	5.9 (0.015)
Examples of consequences and/or	84.2	84.6	84.0	0.01 (0.932)
Calls for attention to businesses, industry and/or government	47.4	69.2	36.0	11.4 (0.001)
Guidance for the reader	31.6	46.2	26.7	5.83 (0.016)
Personalized or appellative language	42.1	64.1	30.7	11.8 (0.001)
Local or proximity approach	45.6	69.2	33.3	13.3 (0.000)
Positive approach	21.9	28.2	18.7	1.4 (0.243)

The last three columns give the percentage of texts written by *Mercury News* journalists (n = 39) and by agencies (n = 75), respectively, the Pearson test χ^2 value (df =1), and the P value.

Definitions and/or explanations of concepts directly or indirectly related to the climate phenomenon appear in about half (46.5%) of the texts. As for rhetorical devices (33.3%) such as comparisons or metaphors, they are mainly used to explain the effects of global warming (78.9%). Other strategies noted in the scientific literature are also observed,

such as explanations of the causes and effects of climate change (Parratt, 2009: 135; Hansen, 2010; Jones & Peterson, 2017) and, above all, exemplification (Andersen et al., 2017; Grabe et al., 2017; Zillmann, 2002): causes of climate change are directly or indirectly addressed in half of the texts (50.9%) and examples of consequences are provided in most of them (84.2%).

Both the educational component, and the solutions and action-oriented frames typical of constructive journalism were found in pieces that provide guidance to readers on how to act individually (31.6%) and that include links to find more information if desired (15.8%). We also observed examples of the public-oriented frame, which gives greater prominence to the reader (Norgaard, 2011; Roeser, 2012) by the use of appellative or personalized language (42.1%), and which is sometimes even used in headlines (18.8%).

Visual resources are also important in writing about climate change. Their main use is to show examples of the consequences of climate change (by means of photographs, graphs, and videos in 59.4%, 4.2% and 2.1% of cases, respectively). Less frequently, photographs (15.8%), videos (5.3%), and graphics (2.7%) are used to provide guidance for reader actions, or to illustrate the causes of climate change (12.1%, 3.5%, and 3.5%). Rarely are visual resources used to show definitions and/or explanations of concepts. These patterns coincide with studies of other media, where graphic resources are mostly used to convey the effects of climate change (Grittmann, 2014; Rebich-Hespanha et al., 2014; Metag et al., 2016; Wang et al., 2018), which are visually more impactful.

However, *The Mercury News* breaks some trends observed in other research. As explained in the literature review, the media has received some criticism for representing climate change as a culturally and geographically distant process with little influence on people's lives (Carvalho & Burgess, 2005; Fernández-Reyes, 2018). In the case of *The Mercury News*, however, almost half (45.6%) of the examined texts have a local approach – referring specifically to local geography or personal impacts. The positive approach that characterizes constructive journalism is also present in nearly a quarter of the pieces (21.9%).

Meanwhile, the cross-referencing of variables yields some interesting results (Table 2). When comparing the texts authored by *Mercury News* journalists with those from news agencies, we observed that the former contain significantly more direct mentions of climate change or related concepts, allude more frequently to the causes, are more interpretative, offer more guidance to the reader, use more personalized or appellative language and use more local approach. In other words, local journalists use more strategies for a better coverage of climate change and play a greater educational role than do the news agencies. Furthermore, they also play more of a watchdog role, for example, in stories where they draw the attention to how companies, industries and/or governments should act to combat climate change (Table 2). This is understandable, however, given the more objective and neutral tone expected of agency texts.

Finally, comparing the variable 'type of text' with the other variables reveals that interpretive pieces contain more mentions of climate change or related concepts (95,5%; $\chi^2 = 11.95$, P-value ≤ 0.001) and also more guidance to readers (51,9%; $\chi^2 = 5.65$, P-value ≤ 0.017), than in purely informative ones (57,1% and 26,4%, respectively). These results reinforce the idea that interpretive texts, whether they have a news hook or are

purely interpretive, provide added value in climate change communication (Brüggemann & Engesser, 2017).

3.2. Interviews with journalists

In this section we analyze the replies of the three *Mercury News* journalists interviewed for this study, identified as I1, I2, and I3.

Two interviewees are the staff journalists of the paper who regularly cover environmental issues, while the other does so only occasionally and says they then rely on the help of more specialized colleagues. None receive specific training or direct suggestions on how to improve their reporting. The responsibility to place a 'climate change' label at the end of their pieces, which involves deciding whether the content is related to the phenomenon, is shared between editors and authors:

> I'm embarrassed to say it's fairly random, the reporter or the editor might not think at the time (…). If I'm just writing a straight story about say, a wildfire, I don't include climate there. If we're talking in the story about how climate change is making wildfires worse, then I would include it. I imagine that some of the stories I write should be listed in the climate tag but aren't. Decisions on exactly what tags we're going to use are often made very quickly. (I3)

They again mention speed in explaining how the online format has affected the way news is produced. “The public expects when something is happening to see a story immediately and if we are to remain relevant, we are doing stories in a hurry”, but “speed is the enemy of accuracy” (I3). This affects the news content of the stories:

> The challenge is how do we write quick, accurate short stories on breaking news? How do we write longer-term stories that explain the context and the history and more detail? And then how do we do in-depth projects that might take months and look at databases and investigative-type reporting? (I3)

This helps explain why informative texts prevail over interpretive ones in *The Mercury News*, despite several authors pointing out the value of going beyond breaking news (Rowan, 2003; Brüggemann & Engesser, 2017; Hermans & Drok, 2018). Indeed, “very rarely do we do just interpretive, my favorite stories are those that are breaking news, but they also have interpretation, there is a news hook” (I1). Staff cuts in newsrooms also hinder specialization in the digital environment (Painter, 2016) to which senior journalists have had to adapt:

> If maybe before you had four environment writers, now you have one. And so that person has to cover many different things and that makes it more difficult to do long-term projects (…). The Internet has given billions of people access to information, and a few powerful people aren't just the keepers of information anymore (…), but reporters who have worked in both eras had a hard time and a lot of people quit. But younger reporters, all they know is what they see now. (I3)

These cuts could also be why there are many more stories coming from news agencies (which include international and national stories, as well as those with a local focus) than written by journalists from the newspaper itself, as discussed above. This pattern corroborates similar financial impacts on other types of news media (Lewis et al., 2008; Takahashi & Meisner, 2013; Arcila et al., 2015).

The interviewees noted other difficulties. "Scientific stories are usually abstract and technical" (I1), so almost half of the texts analyzed include definitions or explanations of concepts related to the climate phenomenon (something recommended by Parratt, 2009; Hansen, 2010; and Jones & Peterson, 2017, among others). Also, “readers want things to be definitive, but it's hard because science isn't always definitive” (I3) noting, for example, that “explaining which things are direct results of climate change, and which things climate change is making worse, can be tricky sometimes”.

On the other hand, all three agree about the importance of highlighting the connections between climate change and many other issues. “As climate change continues to spread and worsen and pervade everything, people who aren't environmental science reporters need to work these issues into their stories” (I3). Unless they are particularly interested in climate change, “readers don’t usually look specifically for news in an environmental or scientific section” (I2), and therefore,

> it's better to intersperse it so when they're reading articles about something else, they're more likely to see it. And, also, it means that it ends up on the front page more often than when there is a science section. And, also, the stories I write about wildfires, endangered lizards, geoengineering, weather stories or drought, that's science, but it's also most general interest. (I1)

In fact, “I rarely write about climate change per se; I come to it from a lot of directions but then I'll do a story about these other things and then reference climate change” (I1). One interviewee admits that they do not always make this connection, and our content analysis showed that more than a third of the pieces analyzed do not contain direct mentions of climate change or related concepts despite being labeled with 'climate change', perhaps “because we've either forgotten it or it gets cut from editors, or it may seem parenthetic to the topic. It's a good discipline to remember. Maybe not at the top, somewhere in the story”. (I3)

They recognize the important role journalists play as gatekeepers, selecting which information to present and how to frame it for the public (Shoemaker and Vos, 2009), and they are aware that establishing a link between general interest stories and climate change is a very useful strategy for educating readers about climate change:

> The public is not that interested in reading about climate change, unfortunately. But if you frame the stories in a different way, if you talk about a wildfire story or a heat wave story, or a flooding story, or the story about smoke in the air from fires (…) if we mentioned climate change in those stories, people read them and then learn about climate change. (I3)

The journalists mentioned other practices when describing their work, such as the inclusion of practical information in their texts – “stories that are most successful are the ones that have information people can use with practical steps that they can take” (I1) – or “a photo with every single story, if readers are engaged by a photo, they're more likely to read the article” (I1). They also refer to the adoption of a local angle (Moser & Diddling, 2011), referring to personal proximity: “how will this affect my day-to-day life?” (I3), or geographical proximity: “at the end of the day they care about news that affects them, which is local news” (I2). Such local or personal proximity angles are present in almost half of the pieces, which shows the relevance that this regional newspaper gives to the local approach.

The concept of 'constructive journalism', more commonly used in academic environments, was unfamiliar to the interviewees, but they nevertheless practice it; content analysis identified use of reader orientation, appellative language, and a positive approach. Interview reflections noted an orientation toward solutions; “should play some role suggesting things to do when, for example, there is a drought and people want to know – how do I use less water?” (I3). However:

> where it gets tricky is telling people things on climate change that even environmentalists and scientists don't agree on. So, should we tell people nuclear power is a good idea for solving climate change? (…) Should we tell people that they should not be eating meat? (…) The answer to these problems is not just black and white. There is no absolute right and absolute wrong. (I3)

“A lot of people still see it [climate change] as a distant problem and feel overwhelmed about it, so they look at those stories and say, this is just going to make me sad” and “they feel like, what difference does one person make, so it might be hard to get them understand that they can make a difference and to make lifestyle changes” (I3). It is for these reasons that they practice positive orientation that “helps people feel less helpless” (I1) and

> “makes them realize these laws work and make it more difficult when industry and politicians wanted to try to weaken them. And why do we have the laws and the technology? Because journalists and environmental activists shine a light on the problem. So, we need to tell the public when things are going wrong, it's part of our job to sound the alarm, but we need to tell them when things work too, because if we don't, they won't have hope”. (I1)

This 'sound the alarm' function was emphasized by an interviewee who occasionally covers environmental issues and aspires “to be a watchdog, a reporter and a public service reporter” (I2). On the other hand, those specialized in scientific topics are more inclined to an educational role (supported by Fernández-Reyes, 2011; Parratt et al., 2021): “I think different journalists take on different roles. Good journalism does all (…) but lot of science reporting is what you would call educational, I call it explanatory journalism” (I3), described thus:

> A large part of the public is pretty scientifically illiterate. So, I see my role as closing that gap, or taking people from where they are to where they need to be to understand. People need to have a level of understanding that matches the science. And we're not there yet. Journalism is really one of the few places that can really help their education. (I2)

The interviewees also perceived a gap between themselves and academia, similarly suggested by Howarth & Anderson (2019). This is reflected both in their claim for scholars to contribute not only to the academy but to society, and in the lack of specialized training on climate change reporting and of familiarity with the concept of 'constructive journalism', which is widely discussed among academics, noting:

> The solution is for universities to encourage professors to communicate more with the public. Academics get rewarded for publishing research, not for being in the newspaper. Many scientists are nervous that the reporter is going to misinterpret what they say and harm their reputation. (…) But if all you do is study climate change and write articles in journals that sit in libraries that nobody reads, what's the point? Why did you become a scientist? Why did I become a journalist? Because I want to make the world a better place. (I3)

Finally, the one interviewee synthesized the challenges of journalists communicating about climate change:

> Number one, enough time and enough journalists, and number two, figuring out a way to make climate change interesting, relevant, and easy to read for average people (…). In a democracy, journalists have a lot of power to influence people. We have a lot of responsibility to get it right and I think we really have to be fair to people while still following the science. (I3)

4. Conclusions

This study focuses on *The Mercury News*, a large regional U.S.A. newspaper in California, a state deeply impacted by this problem. It examines the frequency of the use of discursive strategies expected to contribute to improving news coverage of climate change, coupled with the perceptions of their use and of professional constraints and contexts that could affect their use, according to several authors of such stories relayed to climate change.

Content analysis revealed frequent use of definitions and/or explanations of climate-related terms along with rhetorical devices such as comparisons to familiar ideas. Other frequently used tools included explanations of the causes and effects of warming, the use of exemplification, and visual resources (RQ1). These findings are consistent with the interviewees' perceptions of their work as environmental journalists, prioritizing their educational role over being watchdogs of industry or government. They are very aware of their social responsibility and they see their biggest challenge is to make climate change interesting, relevant, and easy to read for the average person (RQ2).

The Mercury News breaks with trends highlighted in the literature where climate change is represented as a culturally and geographically distant process with little influence on people's lives. Instead, *Mercury News* journalists rely on a local approach, frequently referring to geographical or personal proximity. The journalists´ reflections and our content analysis of their work show they practice 'constructive journalism', providing guidance for action directly addressed to the readers, appellative language, and a positive approach, even though they said they were not specifically familiar with this concept (RQ1 and RQ2).

The content analysis and interviews verify the demands for speed of publication in the digital environment, and the economic cuts in the newsrooms affect how climate change is covered and limits specialization among journalists (RQ1 and RQ3). The strong majority of news stories on climate change topics were not written by the journalists of the newspaper but instead had been provided by news agencies. Informative texts out-numbered interpretive ones 3.5:1, even though interpretive texts have added value for effective communication. Journalists face difficulty conveying scientific topics that are abstract, technical, and often surrounded by uncertainty and disagreements, to readers who demand definitive and instantaneous information (RQ2).

Finally, the interviewees are aware of the cross-cutting nature of climate change and the value of making the connections to other issues, although they admit that they do not always do so. Their reflections on strategies to improve coverage of climate change, seemed more intuitive than planned, and the lack of specialized training or suggestions on how to improve their reporting about climate change (RQ3), are consistent with their view that the academic world is poorly connected with the public and the press. More dialogue between researchers and journalists could therefore improve communication of climate change.

In short, this study shows how a regional newspaper like *The Mercury News* is affected by the economic crisis and the pressures of the digital environment like others are, but it also has peculiarities such as the considerable use that its journalists make of discursive strategies in line with what they consider to be their main role, the educator; and its “reliance on” the local approach, which reflects the importance that the regional media can play in communicating climate change compared to the national and international media. Another finding is that their journalists see climate change as a multidimensional problem that is intrinsic to other topics, but readers may not perceive this connection because they don`t always mention the term climate change in the text. This is an interesting finding that other newspapers might take into consideration.

Future research could extend this study by examining the ways in which readers receive climate change information produced with the various strategies we have analyzed, and how they apply it to their own lives.

5. Limitations

While this case study helps understand the specificities of the role of a regional newspaper to shape public engagement with climate change, the social peculiarities of the technologically focused Silicon Valley region, surrounding agricultural landscapes,

and a history of diverse environmental challenges, may limit the number of similar cases to which the results can generalize. In addition, the content analysis took place during the turbulent calendar year 2020, coincident with a global pandemic, tumultuous national politics, and locally significant climate-change events. As noted by an interviewee:

> We had a drought in California. We had fires. Those were huge climate events, but we also had COVID. So, a lot of science and environment reporters weren't doing as much pure climate reporting. And, also, Trump was still president. So, there was almost no federal climate news (…) just before the pandemic when Jerry Brown (previous governor) was still in office, climate was one of the biggest stories in California. (I3)

While only three journalists were interviewed, those three represented nearly all the staff at *The Mercury News* who have been writing recently about climate change issues, include the only journalists specialized in environmental issues. That suggests that our sample should be robust for inferences within the case study, but inferences to environmental journalism more broadly is limited.

Two particular avenues may be fruitful for future work. First, it would be instructive to repeat the content analyses over other time periods, and specifically examine how events that shape the lives of readers and the attention of the media affect approaches to communicating about a long-term, complex issue such as climate change. Second, parallel interviews with news agency journalists who deal with environmental issues could be combined with content analysis and interviews of *The Mercury News* journalists to more deeply explore the interactions between discourse choices and the gatekeeping practices of climate change issues in the media.

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