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Engaging Citizens for Climate Change—Challenges for Journalism

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ABSTRACT

How issues are framed in journalism in terms of problems, solutions, and levels of responsibility is of great importance in order to engage and lead toward individual and collective action. Data journalism has been acknowledged as a practice that often features a high level of interactivity, with the potential to engage the public. In this study, we investigate the content and production of climate change reporting in Swedish public service data journalism and discuss how frames are used in this alternative form of moderated science communication. Our results indicate an unconventional merger between science communication and data journalistic practices where motivational framing is used only to some extent as a way to increase public engagement with climate change. We also found that producers focus on educating and raising awareness rather than engaging the public and that they are guided by the ideal of objectivity.

KEYWORDS

Climate change; data journalism; framing; engagement; public service; objectivity

Introduction

For several decades climate change and global warming has been considered one of humanity's main challenges. Action has been called for by scientists and activists, and the topic has been widely reported in news media. Media and journalism have also been identified as key actors in the work towards a sustainable society and bear a particular responsibility to inform and engage the public (Berglez, Olausson, and Ots 2017; Hackett et al. 2017). Public engagement and other measures have been considered important in order to come to terms with the huge challenge that climate change poses, and studies indicate that media reporting and the framing of climate change may increase public concern and engagement (Olausson 2009; Lewis, Wahl-Jorgensen, and Inthorn 2004; Nisbet 2009). While previous research has found that digital-native media and legacy media cover climate change differently (cf. Painter, Kristiansen, and Schäfer 2018), and also to some extent analyze the role of alternative media (Hackett et al. 2017), there has been little study into how traditional climate

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change reporting differs from more recent forms of journalism, such as data journalism. Compared to other journalists, data journalists stand out in their vision to create stories that can only be told with the aid of data, thereby uncovering connections that could not have been found using analogue journalistic methods (Appelgren et al. 2020). Hackett et al. (2017) argue that there is a need for journalistic formats to encourage public engagement and mobilization in relation to climate change. In this context, we wish to put forward data journalism as having potential to do just this and with our study contribute to the understanding of how data journalism increases public engagement with climate change.

The practice of using data journalism working methods requires skills such as programming, user experience and statistics (Borges-Rey 2017; Appelgren 2018; Loosen, Reimer, and De Silva-Schmidt 2020). Summarizing the research on data journalism, Hermida and Young (2019) state that scholarly attention has mostly revolved around data journalism as a process, seeking to detail the routines, roles, and responsibilities of the actors involved (p. 23). Data journalism projects often feature a high level of interactivity, user participation, multimodality, interconnected processes, and choices for audiences to create and find their own stories in the data (Appelgren 2018), and, compared to more static forms of reporting, these projects have the potential to engage the public on a larger scale than before (Felle 2016).

We are interested in how journalism and news media can work to potentially increase citizen engagement in relation to climate change and how different media play different roles and face different prerequisites to do this. Engagement is here defined as caring and being willing and able to take action. Furthermore, activity in the form allowed by the interactive nature of data journalism could be a step toward increased engagement. Thus, we wish to explore whether engaging with and through media influences public engagement in terms of caring and willingness to take action, and if it does how this process occurs.

Commercial media and public service media do not have the same functions and tasks in society. Commercial media is closely related to financial interests, promoting norms of high levels of consumption of e.g. cars, travel and technology, while public service media mainly is associated with values such as diversity, freedom and equality. Public service media also focuses on informing and educating the audience (Gunster 2017; Hackett 2017; Syvertsen 1999). In this article, we explore how Swedish public service media frames the issue of climate change within the increasingly digital media landscape in Sweden and how the interactive features of data journalism may contribute to increasing public engagement. The Swedish public service companies SR (radio broadcaster) and SVT (television broadcaster) have a long tradition of producing data journalism (Appelgren and Nygren 2014). The content and output of news and current affairs have been areas of focus for defining the role of public service media, and the norm of objectivity has been central (although debated) for Swedish news media (cf. Jönsson 2015; McQuail 1992; Syvertsen 1999). Objectivity is also closely related to the discussion on certainty or uncertainty in science communication, not least so in relation to the issue of climate change (cf. Friedman, Dunwoody, and Rogers 2012).

Similarly to how objectivity is central to Swedish public service journalism, it was important in the development of what we today denote as data journalism. The

scientific methods that inspired computer assisted reporting and precision journalism offered a way to use data-gathering and analysis tools of science to be measured, named, and, thus, objectified. Therefore, a positivistic objectivity has come to dominate both computer assisted reporting and precision journalism (Wien 2005). Anderson (2018) argues that the current conditions of uncertainty (involving the use of data as journalistic evidence) has made journalism double down on its claims of objectivity (186), perhaps, in order to balance the dependency on the public as both a subject of analysis and a source of professional legitimation (196).

Published data journalism projects often include statistics and may, thus, look like science, but, in reality, data journalism represents a compromise between scientific and journalistic standards (Wormer 2018, 230). Wormer (2018) argues that if too much information is presented from scientific studies it may reduce the news value, and audiences are unable to understand more sophisticated presentations of statistics; thus, it is more appealing to media houses to “do something with data” with a strong tendency to focus on visualization techniques. Data journalism specialists are sought after for their skills and competence inside news organizations (Hermida and Young 2019). However, their expertise is seldom in science (or environmental) journalism; instead, what makes them stand out is their self-taught IT skills (Wright and Doyle 2019). In this context, typical journalist competences such as general competence, subject competence, process competence and professional values as suggested by Donsbach (2014) are important but appear subordinate. Guo and Volz (2020) suggest that updated core competences for the broadcast industry include technical skills, news judgment, writing, editing, shooting, and reporting. Notably, Nygren and Appelberg (2013) found that the lowest share of Swedish journalists covering a special area compared to other types of media is found in Public Service Broadcasting. The emphasis here has been on multiskilled reporters.

The aim of this article is to analyze how data journalists at Swedish Public Service companies frame climate change and if their published work aims to lead to increased public engagement concerning this issue. We will study three different data journalism projects about climate change and carbon emissions from Swedish public service media with three main research questions:

RQ1: How are climate change and carbon emissions framed in these projects?

RQ2: What are the producers’ aims with these projects?

RQ3: How are the framing in these projects and the various interactive elements used in order to engage the public?

Data Journalism, Engagement and Framing

Data driven stories about the environment are frequent within the genre of investigative reporting, such as using geodata, for example, to reveal environmental hazards in the form of pollution or waste dumps (Houston 2014) or open data, for example, to explore outcomes of environmental policies (Gray, Chambers, and Bounegru 2012). The practice involves journalists working with software, spreadsheets, and computer programs to find patterns and meaning in data, and in environmental data journalism

it can include interviews and data coming from scientists, as well as the general public in the form of crowdsourcing (Wyss 2018). Stories are often based on open data, public records and documents (Aitamurto, Sirkkunen, and Lehtonen 2011), rather than results obtained through science. Furthermore, data journalism facilitates new ways of engagement (Ilgan and Soriano 2020; Borges-Rey 2017). This type of engagement has been connected to interactive features aided by digital technology, much like what has been suggested by scholars as “participatory journalism,” where journalists and audiences connect in collaborative and collective action with the aid of the online environment (Singer et al. 2011). In the context of big data visualizations, Kennedy et al. (2016) has suggested six factors that influence engagement in terms of users staying with a visualization and being willing to explore the data within it: subject matter, source/media location, beliefs and opinions, time, emotions, confidence and skills. These factors relate to the user, the visualization text, and the context of engagement and are not all under the control of the producer. Features of interactivity that make people engage with the news differ from public engagement.

Public engagement as understood in relation to citizens’ roles in democratic societies can be defined in different ways and is often closely related to the concept of participation. In this study, we use the word engagement instead of participation because we mainly address prerequisites for engagement, even if that engagement could lead to (political) participation. As stated above, engagement is here understood as the extent to which the citizens care about an issue and are willing and able to take action. Previous research has shown that there are different forms, levels and degrees of participation and engagement in relation to news media (Egan Sjölander and Jönsson 2012). The literature on climate change communication notes that the main goal of this communication is to reduce climate change impact through public engagement, but there are several possible ways (involving conceptualizing the roles and responsibilities of the public) of reaching this goal (Wibeck 2014). Engagement in relation to climate change communication has been said to involve a combination of cognitive, emotional/affective and behavioral factors (Ockwell, Whitmarsh, and O’Neill 2009; Whitmarsh, Seyfang, and O’Neill 2011). There are, however, also several barriers to public engagement with climate change that can be summarized into three main categories: 1) scientific illiteracy, 2) socio-cultural factors, and 3) a lack of a sense of agency (Lorenzoni, Nicholson-Cole, and Whitmarsh 2007; Wibeck 2014). Lack of a sense of agency points to the problem of not making people see that they can do something about the problem and that this action is valuable (behavioral component of engagement).

Recently, several data journalism studies have pointed to decreasing interactivity in data journalism (Anderson and Borges-Rey 2019, Wright and Doyle 2019). Nevertheless, interactivity is still fundamentally important and prompts certain user behavior that may be related to audience engagement. Inspired by Stalph (2018), who analyzed levels of interactivity in daily data-driven stories, we will use Schulmeister’s taxonomy of six levels of interactivity (2003) in our analysis. This taxonomy was developed to design learning systems, but it is also appropriate for data-driven stories since it consists of didactic elements where readers can derive information and knowledge from the use of data-driven graphics (Stalph 2018, 1335). At the first level, content is constant, but the user may watch, read or listen to multimedia components. The user

cannot influence the component representation at this level. At the second level, the user still cannot do more than watch, but when the user clicks on something, such as an image, they might see another picture, select options from a menu or via links, see several versions of a diagram in a sequence, or listen to several music clips, video clips or animations. At the third level, the user can manipulate the components, for example changing the scale of a two-dimensional diagram, rotating the display of a three-dimensional animation, or jumping to other segments of a video by clicking interactive objects in video sequences. The objects are still unchanged since it is merely the form of representation that is altered and not the content. At the fourth level, multimedia components such as diagrams, sound and animation are generated by the user upon request. The user can create new representations by entering data or changing given parameters. The fifth level allows users to visualize their thoughts and create mind maps or objects such as mathematical formulas and calculations with provided tools, and, finally, the sixth level presents the possibility of “intelligent” feedback to the user through pre-programmed meaningful actions.

While interaction prompts active user behavior, it does not have to result in action. Action would include individual lifestyle changes as well as engagement with political policy issues (cf. Hackett et al. 2017). According to Gunster (2017), the main barriers to action are not a lack of information and understanding but instead how the issue of climate change is framed in relation to personal and institutional constraints. It is thus important to analyze how the framing of climate change can enable as well as constrain public engagement.

Framing can be viewed as an organizing idea that provides meaning and lends more weight to certain elements and considerations than others (Gamson and Modigliani 1989; Nisbet 2010). It is also about promoting a certain problem definition and particular solutions, responsibilities and treatment recommendations (Entman 1993; Snow and Benford 1988). Scholars of climate change communication stress the importance of communicating the causes, impacts and possible solutions in order to encourage public engagement with climate change in any form (Wibeck 2014). Framing is thus linked to engagement in that it helps to acknowledge the problem and possible routes to solutions, as well as identifying responsibilities, and, in that context, prescribe certain roles for the citizens. Framing is particularly important for audience engagement when the issue at hand is complex and there is a high level of uncertainty related to it. Climate change is certainly such an issue (Lorenzoni, Nicholson-Cole, and Whitmarsh 2007; Nisbet 2010).

In this study, we analyze the framing of climate change and carbon emissions using Snow and Benford’s (1988) concepts of diagnostic, prognostic, and motivational framing to discuss the link between framing and (public) engagement.

1. Diagnostic framing: identification of a problem and attribution of blame (levels of responsibility).
2. Prognostic framing: a proposal of a solution to the diagnosed problem and issues of responsibility—what needs to be done and by whom.
3. Motivational framing: identification of motivational factors.

Previous research has pointed to a number of framing factors that potentially influence public engagement and motivation in climate change issues. We will focus on the following, in line with Snow and Benford's (1988) ideas on motivational framing:

- Content featuring local, rather than global, effects and proximity (space, time and culture) being more successful for engaging audiences in climate change (Scannell and Gifford 2013)
- Messages that stress the negative consequences of climate change and try to cause fear not increasing individual engagement (Feinberg and Willer 2011; Hackett 2017; O'Neill and Nicholson-Cole 2009)
- Loss frames being less effective than gain frames to achieve positive attitudes toward climate mitigation (Hackett 2017; Spence and Pidgeon 2010)
- Solutions rather than problems as a strategy for enhancing public engagement (Nisbet 2009; Wibeck 2014)
- Providing audiences with an understanding of different possible ways and forms of public participation and underlining the importance of such participation (Gunster 2017)
- Whether an issue (problems, causes and solutions) is framed as certain or uncertain matters for engagement but can go in both ways (Carvalho, van Wessel, and Maesele 2017; Lorenzoni, Nicholson-Cole, and Whitmarsh 2007; Nisbet 2010)

As stated above, several studies focus on media representations and framing of climate change (cf. Berglez 2011; Boykoff 2007; Eide and Ytterstad 2011; Nisbet 2009; Olausson 2009). None of them, however, address the issue and potential of data journalism.

Method and Material

We have used a combined methods approach, analyzing content as well as producer perspectives. The content analysis was based on a qualitative framing analysis of three published data journalism public service broadcasting projects focused on climate change or carbon emissions:

1. Ta tempen på klotet (Measure the "fever" temperature on earth), SVT 2018,
2. Hur långt kan du resa med din köttkonsumtion (How far can you travel on your meat consumption?) SVT, 2018.
3. #Gradhusen: Vad händer när värmen stiger? (Degree houses: What happens when the temperature rises?) SR, 2015.

The projects were selected to represent different topics in relation to climate change. We also chose projects with varying interaction forms. We chose one project from the radio broadcaster SR and two from the television broadcaster SVT.

At the time of the study, SVT did not track audience data on data journalism projects and had no specific target groups in mind since the projects were intended for a

wide audience. The journalists approached the topic as any other informational challenge. In a previous case study of data journalism at SVT about crime data (Appelgren, Hüttenrauch, and Nygren 2012), temporary audience metrics showed that about 0.1% of the total number of unique visitors per week to the SVT website (2.6 million in 2011) visited a selected crime data journalism project and, of those visitors, 75% were returning SVT visitors. A survey of a sample of these visitors found that 70% were male and the average visitor was 48 years old. These findings thus suggest that the data journalism audience at SVT is small and niche-oriented, which is contrary to the intended goal of a wide audience segment. The audience members were interested in learning more about a topic, as indicated in the free text comments where the audience members expressed gratefulness to SVT for providing the opportunity to delve deeper into areas where the members perceived the authorities to be hiding important facts (p. 87).

A qualitative content analysis can be defined as a research method for the subjective interpretation of the content of text data through systematic coding and identification of themes or patterns (Foxwell-Norton 2017). This method is thus well suited for addressing our research problem. We constructed a thematic coding schedule that draws on existing theory and research about framing and public engagement to identify the main problem, cause(s) and solutions (diagnostic and prognostic framing) in the three projects. In this framing analysis regarding diagnostic and prognostic frames, we looked at headlines, sources, metaphors, catchphrases, and graphics (Gamson and Modigliani 1989). Following Olausson (2009), we also strove to identify statements, questions, and arguments that were prominent in the text and the dominant themes and actors. The next part of the coding schedule looked at different factors that previous research identified as relevant for public engagement in relation to climate change, i.e. context (local, national, global), proximity (space, time, culture), loss versus gain frames (including damage to human health or trying to cause fear), a focus on solutions and possible actions, and certainty/uncertainty. Our analysis focused on motivational framing with a possibility of leading to public engagement. Furthermore, we conducted a qualitative analysis of the level of interactivity found in each project.

We analyzed each project separately, starting by thoroughly reading all parts of the data journalism project and focusing on the content. In the next step, we focused on the form in order to identify and analyze the interactive parts of the projects. One of us analyzed the qualitative content of frames and the other the qualitative content of interactivity. Both of us read through and interacted with the three projects on several occasions before, during and after the content analysis, and discussed the analysis.

In order to identify intentional as well as unintentional frames, this analysis was supplemented with interviews with producers. We have conducted two semi-structured interviews with the two teams of journalists, developers, and designers who created the three projects at the Swedish public service television company (SVT) and the Swedish Public Service Radio Broadcasting company (SR). Two producers participated in both of the interviews. The interviews lasted about one hour and were recorded and later transcribed by the researchers. The first part of the interviews focused on the production, strategies and aims of environmental data journalism at the two companies, and the second part focused on the specific projects analyzed in

this study. The interview at SR was conducted in December 2018, and the interview at SVT was conducted in May 2019.

The projects were created when the two groups were separate teams alongside the general newsrooms of the two public service companies. Since the interviews, the team at SR, "Digitala Insatsstyrkan," has been terminated. The team at SVT, "SVT Pejll," was previously a separate group but has since then been terminated, and the staff has been more closely incorporated into the regular newsroom operations.

Results and Analysis

The Projects

'Ta Tempen på Klotet' (Measure the "Fever" Temperature on Earth), SVT

This project is originally from Danmarks radio (Danish public service company DR) and has been altered and translated to be more relevant for a Swedish audience. It was published as part of a number of prioritized themes prior to a national election.

The presented problem in this project is that the temperature is rising due to the use of fossil fuels on the Earth, which is also the main actor in the story. The solution is to stop or decrease the use of fossil fuels. This project is colorful, and there are small movements in the graphical representations of the sea level, water dripping, or smoke coming out from a factory chimney. The audience becomes a co-actor as it is prompted to adjust the graphic, for example changing the sea level or altering the share of energy from fossil fuels. When the levels are adjusted, the numbers (in percentage or other measurements) are shown below the image, next to an orange button with the text "Guess." When clicked, the correct level is shown, and the image adjusts accordingly to the correct answer. This project contains Level four interactive features from Schulmeister's taxonomy (2003) since the user controls the adjustment of the images and creates their own guess, which will alter the image once the "guess" button is clicked. If you guess the correct answer you are not rewarded as would be a typical feature of a quiz, rather all answers are treated equally. The project functions as a guide to basic concepts mentioned in climate change reporting, striving to explain why the temperature is rising, but it presents very little information on how to act in order to contribute to the solution. There is a vague level of responsibility, as only causes for using fossil fuel are presented. Action is mainly addressed in a way that puts society and the collective as the entities responsible for taking action (e.g. mentioning investment in renewable energy). Nevertheless, scare tactics are used to try to cause fear and increase interest. There is a rather dramatic introduction text that highlights the importance of the problem, and the content is framed as being facts with no uncertainty. When asked about the purpose of the project, SVT stated that the intention was to raise awareness:

If you are unaware [of climate change] you might get surprised and think: "oh well!" Then you take what you learn with you, and you learn more while you explore the project. If you get to guess yourself, you get more interested. (SVT 2019)

Sources for the project are stated at the bottom of the page and consist of Danish official authorities, as it is based on a Danish project, and global sources with

environmental data. There is a global context, pointing at geographical differences, but it also uses some examples from Sweden, moving it to a higher level of proximity.

So, to summarize, this project presented temperature rising due to fossil fuels as the main problem and cause (diagnostic) and the solution put forward was to stop or decrease the use of fossil fuels. The use of a global context frame (although with examples from Sweden), vague levels of responsibility, scare tactics, combined with a certainty frame and little information on how to act, leads to the conclusion that the project framing is not motivational in general even if it contributes with raising awareness of a problem and present the audience with some co-acting, interactive possibilities.

'Hur Långt Kan du Resa Med Din Köttkonsumtion' (How Far Can You Travel on Your Meat Consumption?), SVT

The project was published in 2018 and contains no links to articles or video clips. In this project, the audience is asked to specify their weekly or daily meat consumption (i.e. beef, pork, chicken, and lamb) in grams. The presented problem is emission of greenhouse gases and fossil fuels. The cause is explained as livestock production, and, in this case, meat production is visualized through consumption. Framing is used in order to put focus on meat consumption as the cause for greenhouse emissions, relating this consumption to car transportation. The landing page consists of a simple form with four fields, in which the user types numbers. By pressing the green button, the result is calculated through a "meat calculator," transforming the input into greenhouse gas emissions and presenting the equivalent amount of emissions as a distance the reader could drive a car measured in kilometers. The distance is plotted on a static map of the world, originating in Stockholm and expanding to different locations depending on the amount of meat the audience member specifies. The design creates an illusion that the project is calculating the route. In reality, a set of pre-decided images of routes has been created beforehand, and the one closest to the calculated distance is shown with a little bit of delay to make the audience believe the system is taking time to process the data while calculating the route.

It is assumed that the audience knows about the problem with car transportation, as this is not further explained. The individual level of responsibility is emphasized by the interactive form and by addressing the audience as "you." Furthermore, the audience is responsible for any solutions (i.e. reducing their meat consumption). The content is presented as facts with no uncertainty; however, the journalists stated this presentation of the project has received a fair amount of critique:

This is not an exact science, and this is not a pure piece of news based on that this is exactly how it is. Our intention was to raise awareness about meat consumption and make people talk and think about it. The audience member should think: "Shit, is this how much meat I eat! I can go this far?" (SVT 2019)

At the bottom of the project, an explanatory text can be clicked on where the methodology behind the calculator is presented. The sources consist of a list of carbon emissions connected to different types of meat created by the Swedish Agricultural University (SLU) and data from the Swedish Transport Agency on how much carbon dioxide is released per liter of 95-octane petrol with 4.9% ethanol. Google was the

source for the distances to different destinations represented on the map. Even though the project relied on interaction from the audience member, the project does not contain advanced interactive graphics. Yet, Schulmeister's taxonomy (2003) suggests that the project includes Level four interactivity since the static map is not pre-defined but rather based on data from the user, who types in numbers in the form of a query, i.e. the form.

When this project is considered from the perspective of Snow and Benford's (1988) three framing components, the problem is the emission of greenhouse gases/fossil fuels and the main cause is livestock production—meat production in this particular case. The project also has a second known cause: car transportation. The solution is to reduce meat consumption, and the responsibility to do this lies with the individual consumer. The information in the project is presented as certain facts. This project clearly addresses everyday themes of relevance for the Swedish audience—food and travel—but it does not present any alternative behavior or suggest more sustainable choices (besides the implicit message to eat less meat). It does not contain any clear loss or gain perspective, and neither does it acknowledge the health perspective that could have been increasing its motivational potential.

'#Gradhusen: Vad Händer När Värmen Stiger?' (Degree Houses: What Happens When the Temperature Rises?) SR

The project #Gradhusen (The degree houses) was published in December 2015 by the Swedish Public Service Radio as part of a specific section focused on the Paris 2015 conference of climate change. The main problem presented to the audience was that temperatures are rising. In the project, we find framing of the 2-degree goal as the aim or best-case scenario. The focus of the project is on the consequences for individuals and their everyday lives. #Gradhusen was produced by "Digitala insatsstyrkan" (the Digital Task force) as SR and is an internet-based interactive page with a limited number of clickable options changing an otherwise static image of two houses. One of the houses represented a Swedish household in the town of Linköping, while the other house was situated in Karachi, Pakistan. Thus, the context is global for the consequences, but local and yet collective, because of the examples of consequences for the families living in the portrayed houses. The consequences are framed by using certain "clickable" themes (e.g. water, weather, air plants, food, and criminality). The user can choose between temperature increases ranging from 2–6 °C. When an option is clicked, the image changes and new clickable options appear, such as drinking water, sun, pests, or criminality. If these new options are clicked, a pop-up window with explanatory texts and radio clips with scientists appear. Because the user can click but only watch the images change, the level of interactivity is low, suggesting Level two in Schulmeister's taxonomy (2003). The storyline is linear and prepackaged by the journalists, however, clicking is the only way to move forward in the story. Clicking on an information icon in the upper right corner provides the user with information on sources for the project. Interviews with three scientists form the basis of the interactive feature, and the audience is also provided a link to a longer explanatory article with quotes from the scientists. This project contains a certain degree of uncertainty. Three scientists have been interviewed for the project, and links to the interviews are

provided, as well as a special article belonging to the air theme, where a family in India shows how they handle bad air. In the food theme, we find some consequences addressing human health. The project does cause fear, especially for the consequences shown if the temperature rises by six degrees. Then the site changes to reveal the simple message: future uncertain. According to the creators behind the project, the intention was to evoke feelings, but what held them back was the need for a simple design:

Initially, we wanted to create even more of a “doomsday” feeling by adding more places in the world, for example Madrid, Tokyo, Los Angeles, and Buenos Aires. But then, this calls for another dimension with the cost of simplicity. It is all about the packaging for us, and we wanted the user to be able to see the change with just a few clicks. (SR 2019)

As the two previously analyzed projects, the main problem identified in ‘#Gradhusen’ is that the temperature is rising due to fossil fuels. The project focus on consequences with the message that the future is uncertain. It combines a global and a local perspective. However, it does not really present any solutions or ways to act and the level of responsibility is very vague. Even if this project contains some degree of uncertainty in relation to the facts, the main impression is the focus on scare tactics and the aim to cause fear.

Producer Perspectives

The results from the interviews indicated that all data journalism projects from these two public service companies were described as compliments to other material in two distinct ways. At SR (radio broadcaster), creators behind the projects were encouraged to embed sound clips based on broadcast material; while at SVT (television broadcaster), projects were created as stand-alone add-ons to other articles and material published on the SVT news website. Climate change or the environment was not a prioritized topic, and the reporters and creators behind the projects did not have specific experience with climate reporting. Climate change was covered as any other topic would be covered by the two groups.

From the interviews, it also became clear that the creators of the projects had little intention to create engagement in the projects in terms of actions but rather engagement with their product to make people stay for a learning experience. This experience was designed to be as simple as possible, fun, and playful, but yet sometimes scary, in order to evoke emotions to make people think. When prompted to reflect on climate change reporting, one reporter at SVT said:

Regular climate change reporting is descriptive and often connected to a certain event in time, but here you are able to test your prejudices over time. Data journalism is created with a longer durability. The data is sustainable because it is purely based on facts. That is also the case with regular journalism, but then it contains more news angles, people, and opinions. (SVT 2019)

This indicates that data journalism, in the mind of the involved journalists, is not exactly like regular journalism. The aim is to make people aware and educate them about a topic, as one SVT reporter put it:

This is pure public service, I would say. Actually, data journalism fits very well with public service values, to tell stories about hard stuff in a simple way, and to spread information in a way that people get, and to have some fun along the way. There are lots of available statistics, but to explain a database in a regular journalistic report, that is not doable. To get a deeper understanding, or sometimes just understand what type of data or information that is available is what data journalism is good at, to find certain types of news or to give a broader understanding. We want to do it in a fun and attractive way, so that the audience wants to engage with the project and actually look at the data. This is the greatest asset with data journalism, and that is why we use visualization techniques. To publish a data file is no fun. (SVT 2019)

At SR, the group working with data journalism created projects on demand. There was a standardized form that journalists filled out before the cooperation between the group and the journalists could start. This implied that the journalistic practices were, at times, detached from the process of building the project. Even though the interviewed programmer and designer assured the process was iterative, they clearly marked that they were not part of the journalistic process:

I have no agenda with my programming and it is very hard for me to say anything about the journalistic selection. I leave that to the two heads of our groups who are journalists. (SR 2019)

This was contrary to the belief at SVT, where anyone in the group was seen as a journalist or developer.

What is a journalist? If you have worked here for five years, then you are a journalist. I am not a developer, I am a trained journalist, but I work as a developer. I don't think it is good to make these distinctions, as we in our group are constantly approaching things in different ways. Previously, data journalism was commissioned on-demand, but with poor results. To say that developers are not journalists is like talking about developers as if they were not real people, with nothing to contribute with and no interest in the society nor telling a story. (SVT 2019)

We identified several examples of how these producers also influenced through their production context and traditional public service values. Sometimes, basic public service journalism values, like objectivity, are presented as a limitation to what can be done and to their ability to try to engage the audience and cause a certain action.

We are only supposed to present how something is in a very objective way and try to be careful with enforcing our own agendas. [...] We tell people about how things are in different places, not that it is black or white. It is not public service to present a hard angle on these things but rather to tell things in an objective way. (SVT 2019)

Both SR and SVT expressed a limited knowledge of and contact with their audience, and they generally described the target group as the whole Swedish population. On occasion however, they also talked about how the data journalism projects are particularly well suited for a younger audience who is considered to want more 'playful' and 'simple' things.

Summary and Conclusions

In this article, we have analyzed how three data journalism projects and their producers frame climate change and how this framing, combined with interactive features

in data journalism, could affect engagement. We found that Swedish public service environmental data journalism was built on a few common frames in defining the problem, solution, and, in some respect, level of responsibility. Both from the content analysis and the interviews, we found a clear tendency to primarily point toward the individual in terms of whose responsibility it is to act, or merely to get educated. In this respect, data journalism proves to be quite similar to traditional news journalism about environmental issues (Anshelm 2012; Berglez, Höijer, and Olausson 2009; Höijer 2010; Olausson 2011).

But what about the motivation for engagement and action? According to Snow and Benford (1988), motivation requires a framing on duty, meaningfulness, importance of the subject, and a presentation of possible routes for action. In this sense, we must conclude that the framing contributes to motivation only to a low degree. For one thing, the projects neither present any concrete suggestions for ways to engage or act nor focus on the importance of public engagement.

Using Schulmeister's taxonomy (2003), interactivity can be examined as the possibility for the user to manipulate the representational form of objects and content and ultimately get feedback. According to Schulmeister (2003), this taxonomy is compatible with the historic chronology of psychological theories of learning: The reactive lower levels of interactivity tend to assume a behaviorist character while higher interactivity levels rather presuppose and transport cognitive concepts of learning. Future research could investigate if higher levels of interactivity are connected not only to increased learning motivation but also more long-term engagement. Our analysis of these projects shows low to moderate levels of interactivity (level 2 and 4) and, paradoxically, the producers deliberately limit the interactive features in order to keep the audience interested. The stories in the projects are pre-defined, even though some interactivity is provided in line with previous studies to gain a paternalistic story line, where the illusion of choice trumps the real possibility to be interactive (Appelgren 2018).

From the interviews with the producers, it became clear that the main aim of these projects was to raise awareness and educate the audience. This is not surprising, as education is a central tenet of public service media. Engagement in the climate issue and giving rise to collective action were not intended outcomes. However, we found that one main ambition with the projects was to engage the audience with the producer's own products and other contents in the context of the projects and to keep the audience with this more sustainable (durable) content. The projects are considered complements and extensions of traditional journalism. Climate change was not a prioritized area for the two data desks, and the journalists treated this topic like any other topic, using more or less similar data journalistic templates. However, the uncertainty found in climate change data proposed challenges to the two teams. Another perhaps more surprising finding is that the producers also consider it part of the public service role to try new technological tools and promote digital technology.

All in all, the public service context seems important for the producers of these projects. For example, besides the focus on educating the audience, this was expressed in how they referred to the principle of objectivity as a reason for not going further in trying to lead the audience into a certain action. Strömbäck (2003) argues

that a journalist's ability to suppress subjectivity depends on the journalistic methods employed to describe the objective reality as true as possible. These methods should minimize the risk that the content is characterized by the journalist's or others' interpretations of reality (Strömbäck 2003, 32). Hackett et al. (2017) consider objectivity to be a regime and also point to the problem with what they call "objective' monitorial journalism" and that this kind of traditional ideal journalism can favor certain kinds of narratives and frames in ways that work against public engagement on climate change. Thus, the methods used to present data journalism as objectively as possible may not be beneficial for engagement. Here, we believe that data journalists need to find another mode of presenting facts as objective.

Gunster (2017) suggests how journalism can change and work in order to increase public engagement, and we believe that several of these suggestions would also be beneficial for data journalism, such as journalists prioritizing audiences that are most likely to engage with news about climate change (rather than addressing the whole population like the Swedish public service media did in our cases), using a climate justice frame with a focus on normative, ethical and political dimensions of climate change, putting forward cultural values that could work to promote pro-environmental attitudes, beliefs and behavior, and, finally, focusing on experiences and emotions of people and communities that are collaborating to address climate change and in this way cultivate social norms of public engagement and political efficacy.

Previous research points to the importance of segmenting audiences and identifying different target groups in order to increase engagement (Gunster 2017). We therefore find it interesting that the producers in our study had very limited ideas about and contacts with the potential audiences for their projects. Our study is however limited in terms of the audience perspective. Future research should conduct audience studies in order to more fully answer the question of whether data journalism projects have the potential to lead to increased public engagement concerning the climate change issue. Furthermore, the study is limited in that it only focuses on public service data journalism about climate change in Sweden. Future research could also explore comparative public service data journalism across nations and media systems.

One of our overarching findings in this article is that different attributes connected to engagement, such as interactive features, metrics or qualitative audience data, did not play a prominent role in the data journalism projects, and, most importantly, we found that framing to drive engagement was only used moderately by journalists in climate change data journalism.

Engagement is a rich and versatile concept. It is important both as a driver for change in issues regarding climate change and as a central component in interactive forms of journalism. In this study, we have approached the concept of engagement from different perspectives, and as a result we would like to challenge the previous notions of data journalism as a driver of engagement and further advance these discussions in digital journalism studies.

To conclude, we believe that data journalism practice and research alike would benefit from more variety in the approach to engagement. We argue that action and behavior, presenting good options and focusing on public engagement are the most important changes that need to be made if data journalism is to fulfil its potential to

contribute to public engagement. Data journalism could also make more and better use of interactive features to involve the audience.

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Appendix. Data Journalism Projects Analyzed

SVT Testa dig själv: Ta tempen på klotet

Published in 2018

<https://www.svt.se/special/ta-tempen-pa-klotet/>

SVT Testa din klimatpåverkan: Hur långt kan du resa med din köttkonsumtion?

Published in 2018

<https://www.svt.se/special/kottkalkylatorn/>

SR Gradhusen

Published in 2015

<https://sverigesradio.se/sida/artikel.aspx?programid=4891&artikel=6299591>