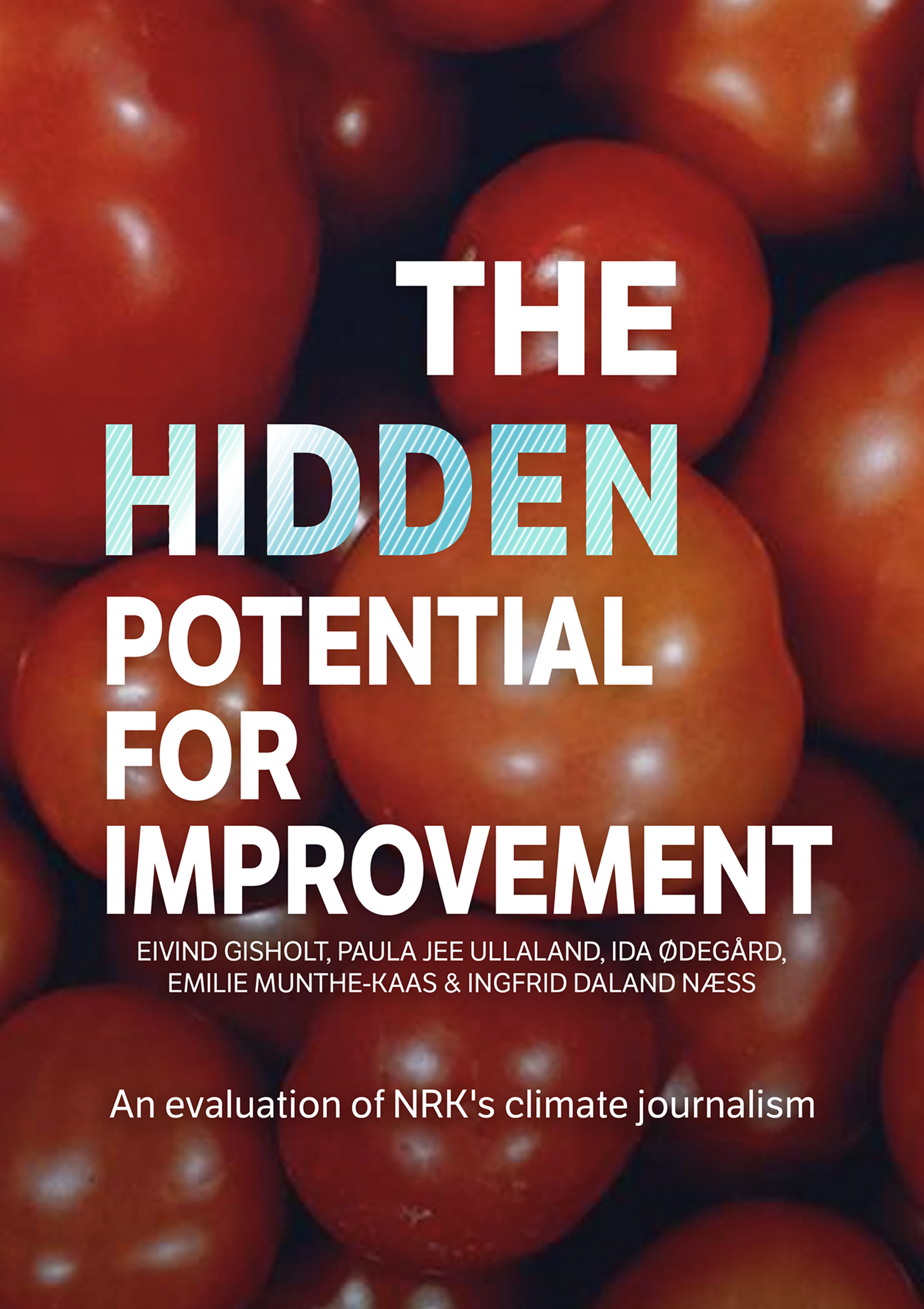

THE HIDDEN POTENTIAL FOR IMPROVEMENT

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An evaluation of NRK's climate journalism

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This evaluation was written as an exam assignment at MIX202 "Design for Media Use" in the spring of 2020. The course is part of the Bachelor's program Media and Interaction Design at the Department of Information and Media Science at the University of Bergen. The course leader was Professor Lars Nyre. Subject teachers were Professor Andy Opel (Florida State University), Senior Engineer Zulfikar Fahmy, PhD Fellow Fredrik Håland Jensen, PhD Fellow Oda Elise Nordberg and Master's Student Jonathan Lindø Meling. The evaluation is translated into English by Kristin Eidsheim.

Introduction

In today's society media plays an important role in communicating climate and environmental information. "The fourth state power" has a responsibility for how they choose to communicate climate-related content because they influence each individual's perceptions, and thus also holds the power to influence the entire population (Holsten and Kildal, 2018). NRK is Norway's largest media company, and the aim of their climate journalism is “[...] to enable everyone in Norway to participate in the climate discussions and make good choices, thereby strengthening and developing democracy. NRK must tell world-class climate stories to the public. ”(NRK, 2020). In this project, which is in collaboration with NRK's climate editor, we conducted an evaluation of a selection of climate-related media content. The purpose of the evaluation is to find out how parents perceive and react to the selected media content from NRK, and advise on how such content can be improved in the future. By linking parents' feedback to the principles of design and climate communication, we have gained valuable insights that enable us to propose concrete changes to the design of media content.

Content for evaluation

Figure 1: Screenshot of the cover of the article "The Hidden Food Waste"

The climate content we have evaluated consists of an article and a video, both of which convey information focusing on the visual presentation. The article is titled “The hidden food waste” (See Figure 1) and deals with food waste in Norway that takes place before food reaches the stores, and is therefore not part of the country's food waste statistics. As a reader you can hear different perspectives from farmers, politicians and employees in the food industry about wastes from different commodity groups and its consequences. The article is a so-called "special article" from NRK, which means that the user scrolls through an article consisting of both text, animated illustrations, video clips, pictures and buttons that you can press along the way.

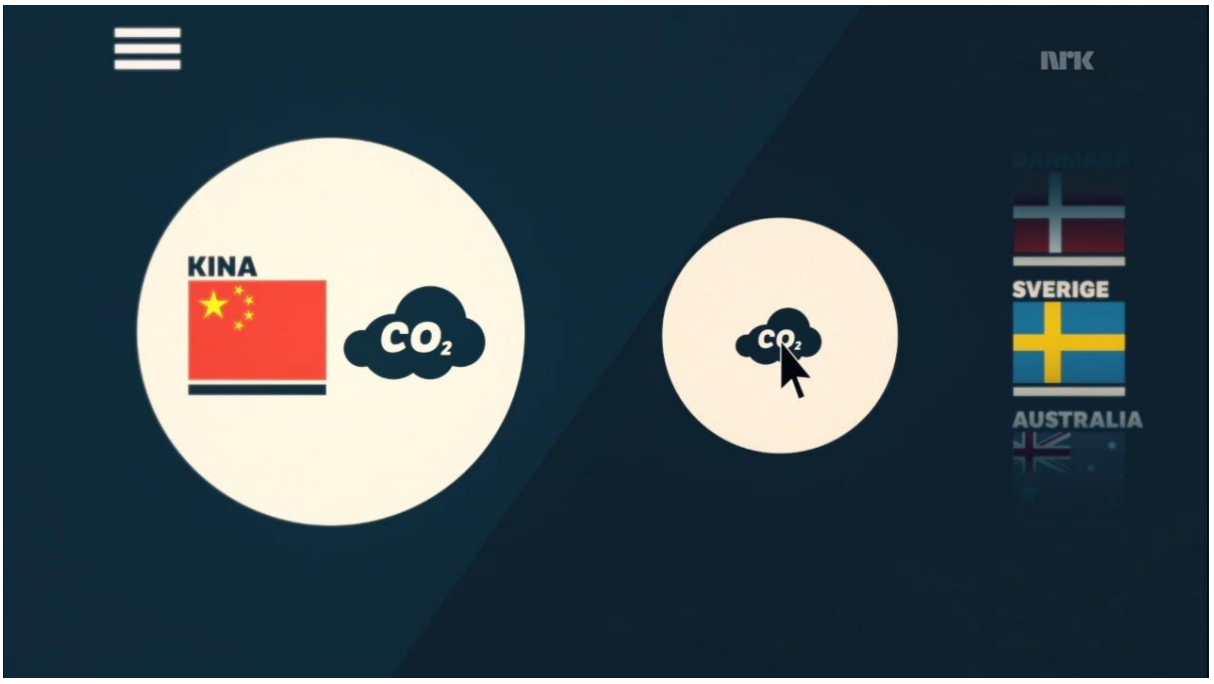

Figure 2: Screenshot from the video "Climate economy with Knut Kvothe"

The second part of the evaluation content is the video "Climate Economics with Knut Kvothe" (See figure 2), which is part of a four-part series produced by NRK for NRK School. The video deals with the character Knut, who wants to solve climate problems by buying climate quotas, and considers the concept behind the climate quotas, in addition to comparing CO2 emissions from different countries. Although the video was originally designed for high school students, we chose this video because, like the special article, it contains visual communication of climate information. A contrast between the article and the video is the length, as the article is over 3000 words, while the video lasts for 2 minutes and 37 seconds. By choosing different content, we gain insight into what kind of dissemination is preferred in the evaluation.

Who did we test?

In collaboration with NRK, we selected the target group of parents with children under the age of 16 to evaluate the selected content. We perceive this group as a group that carries a great responsibility in society as they are raising the next generation. Therefore, we wanted to gain insight into their news habits and how they can be influenced by climate-related news. We believe it is important for NRK to inform the target group so that they can be influenced to make conscious decisions about climate, and pass this on to their children.

Participant	Gender	Age	Occupation	Reads news	Reads NRK
Informant 1	Female	28	Project controller	Daily	Yes
Informant 2	Female	29	Teacher	Daily	Yes
Informant 3	Female	27	Skin therapist	Occasionally	No
Informant 4	Male	50	Professor	Daily	No
Informant 5	Female	26	Project manager	Daily	Yes
Informant 6	Male	26	Bingo host	Occasionally	No
Informant 7	Female	42	Teacher	Daily	No
Informant 8	Male	30	Marketing manager	Daily	Yes

Figure 3: Overview of the informants.

It is important that the relationship between the interviewer and the informant is clear and professional in order to secure valid data (Preece, Rogers and Sharp, 2015, p. 228). Therefore, all informants signed a consent form in advance of the tests. The evaluation was conducted with eight participants (see Figure 3), a selection that is not representative of the entire target group, and the results are therefore not generalizable. However, we can make some assumptions based on how parents react to the selected content.

Method

We have used qualitative methods such as interviewing, eye tracking and stress bracelets to evaluate the media content. Qualitative data is often presented with text, video and image, as opposed to quantitative data presented in numerical form (Tjora, 2017, p. 24). Using several different methods to collect data is called methodical triangulation, and helps to strengthen the validity of the results (Preece, Rogers and Sharp, 2015, p. 230). Stress bracelet data can be combined with eye tracking data, a combination that indicates how users respond to content. The combination of physiological measurements and observations of task performance and subjective responses is called psychophysiology (Lazar et al., 2017, p. 381).

We used two different test designs for the user tests. We conducted semi-structured interviews with all the parents. In addition, we tested two of them with eye tracking and stress bracelets that measure physiological data. The user tests consisted of four parts: Obtaining informed consent, introductory questions, content user tests and content questions. The introductory questions dealt with demographics, climate attitudes, habits and experiences related to news. In the user test, the informant tested the content from NRK. After each stimulation, we asked the parent about their impression of the media content, the presentation of information. Finally, we asked questions related to observations we made during the user test. Before we started the evaluation, a NSD form was filled out and submitted by our course leader. All necessary procedures were conducted and the form got approved.

Semi-structured interviews

We conducted semi-structured interviews with all of our informants. A semi-structured interview may have predefined questions in the same way as a structured interview, but it is open for the interviewer to ask for clarifications or add questions where appropriate (Lazar et al., 2017, pp. 198-199). We conducted the interviews as an informal conversation between the informant and the interviewers.

Eye tracking and stress bracelets

Figure 4: Eye tracking glasses Tobii Pro 4 (Tobii, u.å) and the stress bracelet Empatica E4 (Empatica, u.å).

In addition to the interviews, we tested two informants with two different types of biometric equipment: eye-tracking glasses and stress bracelets (see Figure 4). Biometric equipment is a tool that records data that is unique to one person (Datatilsynet, u.å).

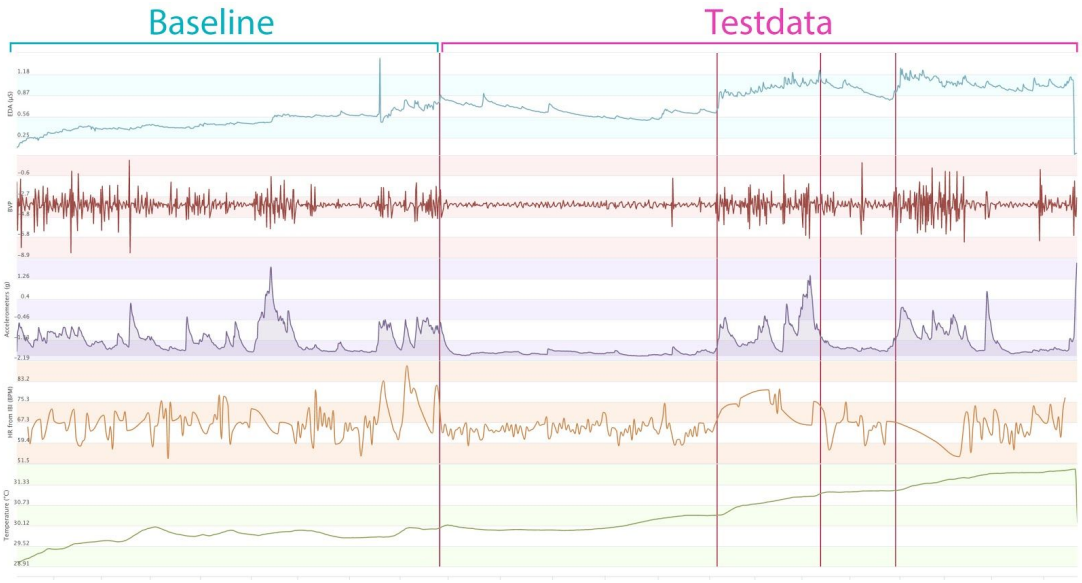

Figure 5: Baseline and test data from informant 4. The data below the blue line is what we call a baseline. The data below the pink line is the data from the test itself, which can be compared with the baseline to see changes in physiological patterns.

Eye tracking tracks the gaze of the user and shows where the user is focusing (Lazar, Feng, and Hochheiser, 2017, p. 370). We distinguish between fast reorienting movements called saccades, and longer focuses where the eye is almost stationary, called fixations (Jacob og Karn, 2002). Eye tracking data is often illustrated by using heatmaps that show where

informants fix their eyes farthest and gazeplots that show informants' reading patterns. For the collection of physiological data we used the E4 stress bracelet from Empatica. E4 measures blood volume heart rate (BVP), movement (Accelerometer), sweat (EDA), heart rate (HR) and temperature (degrees Celsius). To analyze changes in physiological patterns, test data are compared with baseline, the data pattern from before the test start (see Figure 5).

The Hawthorne effect

One challenge with studies involving humans is that they often change behavior when they know they are being observed. This is called the Hawthorne effect (Preece et al., 2015, p. 471). Both objective and subjective data may be affected by this. To strengthen the validity of our results, we tried to create an as natural atmosphere as possible for the informants during the tests. There were always only two of us in the meeting with the informants and we stated that it was the content we wanted to test and not them.

Principles of design and climate communication

Climate journalism has been an important focus during this project. The research report *Climate Visuals: Seven principles for visual climate change communication (based on international social research)* presents seven key findings in the form of principles on how to best visualize climate change. The seven principles are:

1. *Show 'real people' not staged photo-ops*
2. *Tell new stories*
3. *Show climate causes at scale*
4. *Climate impacts are emotionally powerful*
5. *Show local (but serious) climate impacts*
6. *Be very careful with protest imagery*
7. *Understand your audience*

(Corner, Webster and Teriete, 2015, p.5)

We want to link the parents' feedback on the content to the first three climate communication principles. The first principle states that images that appear authentic, by real people with real emotions, have greater influence than posed images. Other principles indicate that the use of new motives, rather than the use of clichés, has a greater influence on people's perception of climate change. The third principle of communication is to mediate the connection between climate change and the individual's everyday life.

According to Preece, Rogers and Sharp (2015, p.25), there are five design principles that one must adhere to in interaction design. The design principles are generalized ideas that will ensure good user experiences. The principles are visibility, feedback, constraints, consistency, and affordability (Preece, Rogers, and Sharp, 2015, p.26).

In this report we will use the principles of visibility, consistency and affordability. The visibility principle says that the more visible features there are, the more likely it is that consumers will know what to do.

The principle of consistency says to always use the same operations and elements to perform similar tasks. The principle of affordability says to make it clear to the user how to use an object, such as a button, (Preece, Rogers and Sharp, 2015, p.26). We will consider whether the content violates or meets the principles of design and climate communication.

Results

We will now present and discuss the main findings based on the psychophysiological results of the tests we have conducted. The findings will first be about parents' relationship to news and climate, further we will look more closely at their experience of the content. We will link the results to Preece, Rogers and Sharp's design principles and Corner, Webster and Teriete's principles of visual climate communication.

The parents are positive about the media's focus on climate

When we asked the parents about their thoughts on the climate focus in the media, most of them were positive. Some also wanted a greater climate focus than it is today, while some felt that there was too much focus on the climate and that they were tired of it. Two of the parents also pointed out that they see that young people in particular are very frightened by a negative climate focus, which they would like to avoid. The majority also wanted their children to be concerned about the climate as they grow older. We also asked if their attitudes towards climate have changed since they had children, where we received mixed feedback. Informant 2 replied that her attitude has not changed due to becoming a parent, but that she has become more conscious with the time. Informant 1 said "I want it to be a nice world for him (his son) and his children, not just as long as I am here myself". The parents who said that their attitudes and habits have changed explained that they felt a greater responsibility to make the world the best possible for the children to grow up in.

Disruptions in everyday life affect how parents read news

The parents answered a number of questions about their news habits. Six out of eight stated that they read news daily, and four out of eight said they read news from NRK. Half of the parents also said they read news while on the move, such as on the bus.

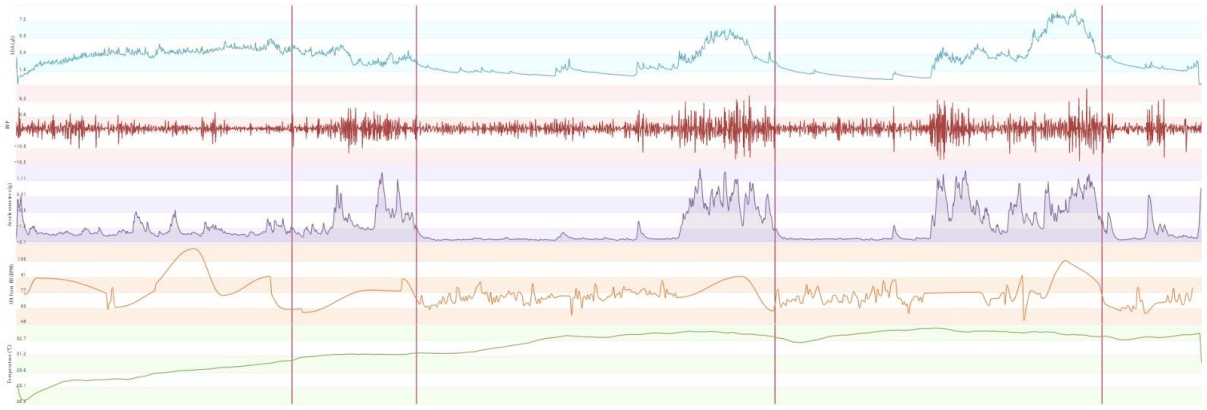

Figure 6: Data from informant 1's stress bracelet. The largest effects in all the graphs occur when she looks at the child. The blue graph measures sweat, the red measures blood volume pulse, the purple measures movement, the orange measures the heart rate and the green measures the temperature.

Informant 1 brought her baby to the test with eye tracking and stress bracelets, which gave us interesting observations and physiological manifestations (see Figure 6). The test was characterized by her having to look after the baby several times while reading. This is a realistic picture of everyday life for many parents as they read news, where they are disturbed.

The article is too long

Six of the parents felt that the article they read about food waste was too long. They were asked to read the article as they would normally, and there were several who chose to finish reading before the article was finished. Several also chose to skim large sections of the article or skip certain sections. Some said that there seemed to be several issues in one article and that it was difficult to remember all the information. There is often a lot of scrolling before the next section of text appears, which creates a lot of dead time. This increases the time it takes to read the article, reinforcing the notion that it is a long article.

Our informants spent an average of 18 minutes exploring the article. The average also includes those who did not read the article. Statistics we have accessed from NRK show that the average time their readers spend on the article is 3 minutes and 33 seconds. We can therefore assume that the finding that parents do not read the whole article may also apply to more in the target group.

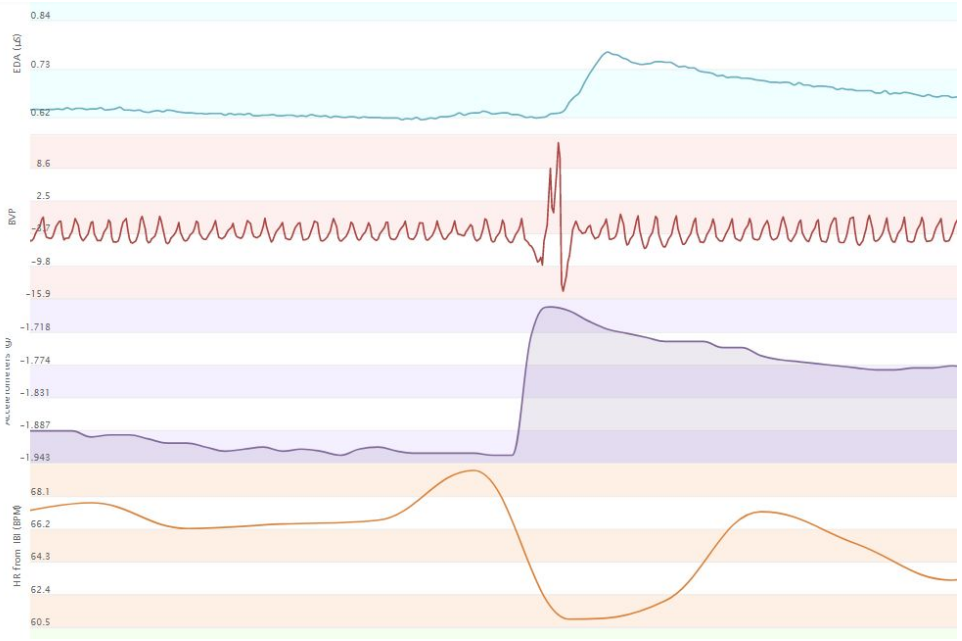

Figure 7: The figure shows physiological manifestations in informant 4. The increase in sweat is from 0.62 to 0.77. The red graph shows the clear manifestation of the blood volume pulse, and the orange graph shows the deviation from baseline in the pulse.

When informant 4 came to the beginning of section four of six, we see physiological manifestations that may indicate an impatience related to the length of the article. The informant did not say anything about this, but the data show clear manifestations in both sweat, blood volume, movement and heart rate (see Figure 7).

Figure 8: Eye tracking screens showing informant 4's gaze flickering.

In addition, the eye tracking shows that the informant flickers with his gaze (see Figure 8), moves in the chair and exhales a little heavier than usual. When the informant reached the beginning of the next section, he pointed out that the article was long. This did not give as clear physiological manifestations, but there are still some minor peaks in sweat and heart rate.

Use of information boxes strengthens the credibility

One specific element we wanted to get feedback on was the article's use of information boxes, because these are the article's only interactive buttons. The majority of informants noticed the boxes early, but informant 8 did not see them until the end of the article, and informant 3 did not see them at all. This indicates that the design principle of visibility is not fulfilled. Of the informants who did see the information boxes, half of them chose to click on them. Most of the informants were positive about the boxes, but informant 4 stated that he had to click on several boxes before he realized what they were.

This may mean that the principle of affordability is not fulfilled. He also stated that "[...] it was kind of reassuring to know that there is something you could go into and look at it. So it reinforces a kind of confidence in the matter and that it was real ". Like informant 4, several people believed that information boxes increase the credibility of the article because they often refer to fact-based knowledge. We therefore see that the information boxes increase the informants' confidence in the matter, but that for some they are not visible and difficult to understand.

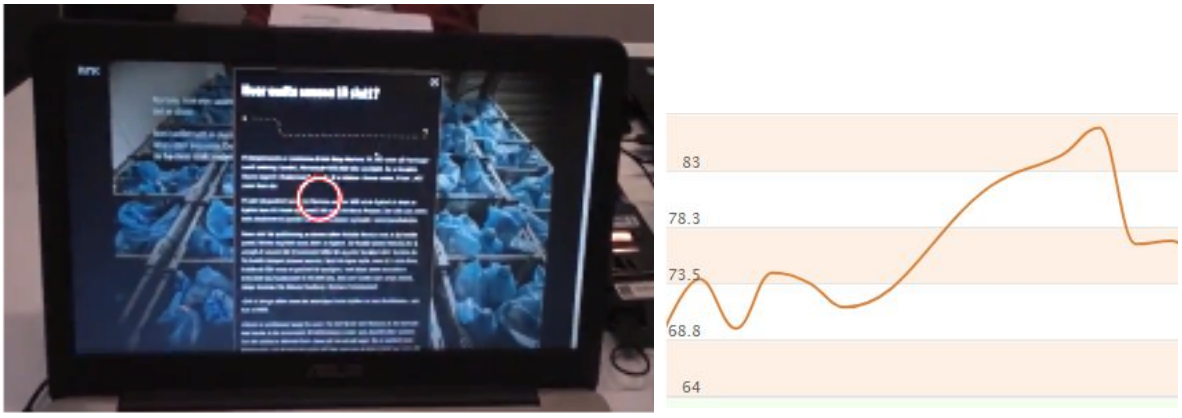

Figure 9: Informant 1 opens an information box with a lot of text, which gives clear physiological manifestations as the pulse increases from 71.46 to 86.68 in 35 seconds.

Informant 1 pointed out that there was a lot of text in the information boxes, and that it was therefore good that it was optional to click on these. When she opened an information box with a lot of text, this gave physiological results (see Figure 9). We asked her what this outcome might mean during the interview, and then she told me that the amount of text was overwhelming but that the theme also made her engaged.

The images communicate a new story in a good way

The majority mentioned that they liked the combination of photos and videos integrated into a news story and that the production was good. Visualizing food waste also engaged several of the informants, when after seeing the content they mentioned that they thought the amount of food waste was terrible and that this should be done something about. Several of the informants stated that they had no idea that there was so much food waste behind closed doors, and we therefore believe that NRK has succeeded in visualizing a climate issue in a new and engaging way.

Therefore, the article meets the climate communication principle of telling new stories. Some informants also said that pictures of people in the food industry telling their story increased the credibility of the case. The climate communication principle of showing real people is therefore also fulfilled as the pictures were perceived as authentic.

Not everyone likes interactive articles - but the content is still engaging

Although the majority of the informants liked the interactive article, two informants said they preferred "plain articles" with black text on a white background. Informant 2 thought it was disruptive with so many moving elements when she read the text, and pointed specifically to the rolling tomatoes. However, she pointed out that she could have fun with this article and would have spent more time on the pictures if she was not in a test situation.

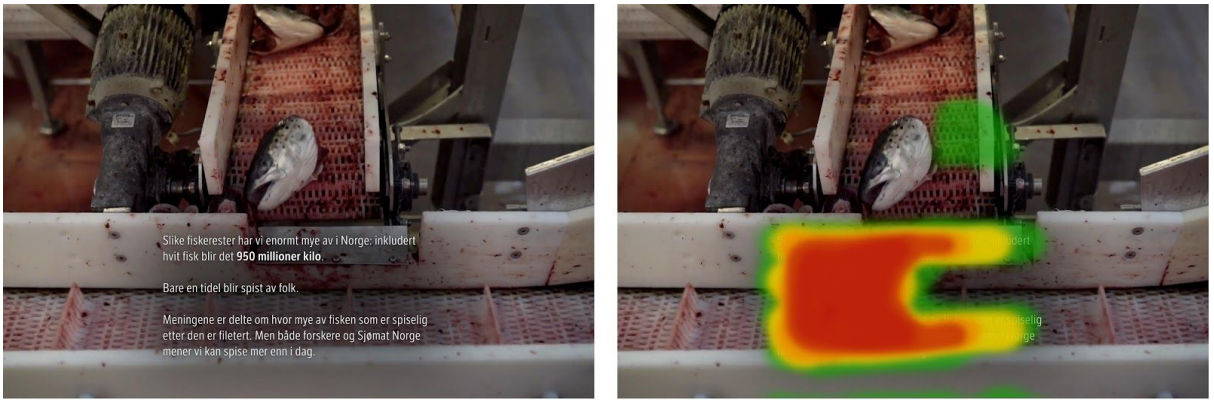

Figure 10: Heatmaps illustrating where informant 4 fixes their gaze the longest. In the illustration, the scale goes from green which is shorter fixations to red which are long fixations. The picture on the right shows that his focus is moslyt on the text.

Informant 4 also stated that he preferred special articles over flat articles, this was also seen in the biometric data. Sweat levels and heart rate were generally very stable, which we assume could mean little engagement with the informant, and the gaze tracking showed that he consistently fixed on the text and did not pay much attention to pictures and videos (see Figure 10).

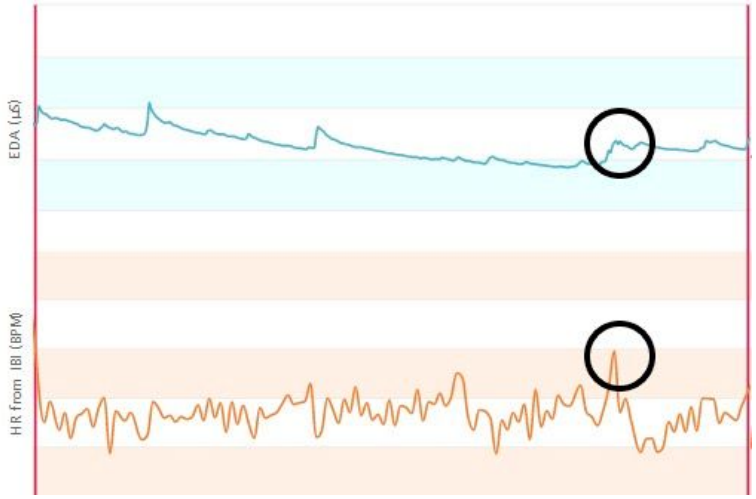

Figure 11: Shows an increase in sweat of 0.13 and a pulse of 12.0 when informant 4 saw a subject he recognized.

What was interesting was that there was a clear raise in sweat and an increase in heart rate (see Figure 11) when he saw an image of something familiar. This regards wha the informant called the "Sunnmørsfjellene", and he stated that he is very concerned about these mountains.

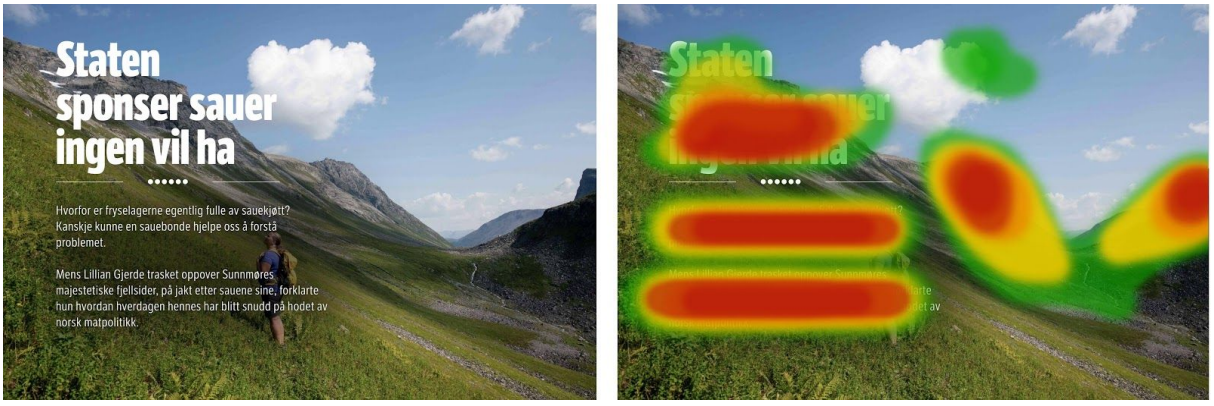

Figure 12: Heatmap showing informant 4 focused more than usual on the background when he saw the subject he recognized.

His reading pattern changed significantly, and his gaze went from fixations on text to moving back and forth between the text and the background (see Figure 12). Here he was clearly engaged and later even mentioned the "recognition effect" as the reason for this.

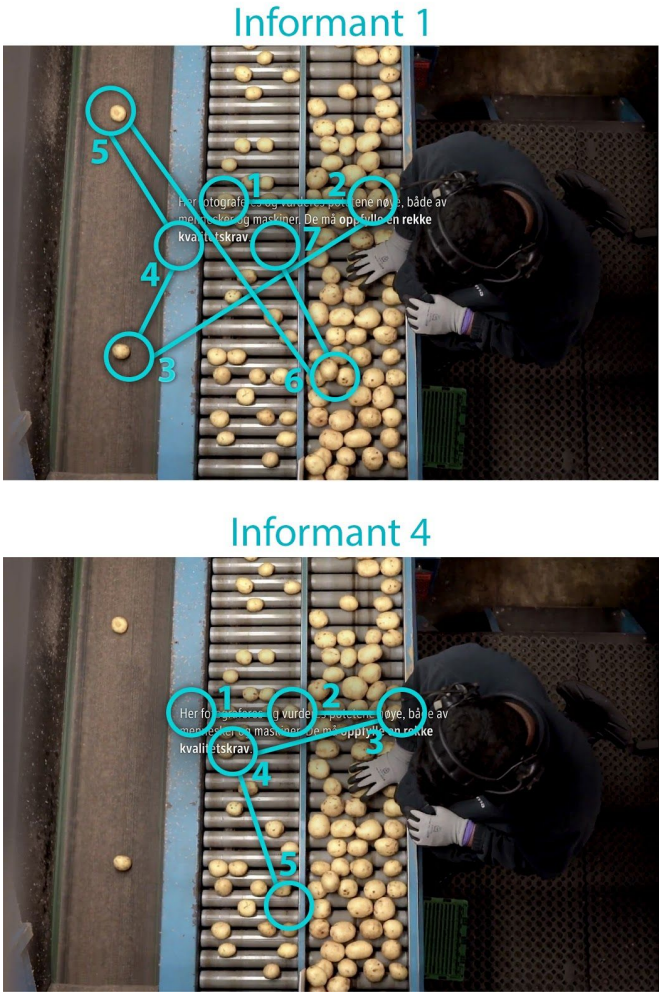

Figure 13: Gaze Plot illustrating the contrast between informant 1 and informant 4's reading patterns.

Unlike informant 4, informant 1 was very fond of such interactive articles and this contrast we saw clearly in the eye tracking data (See Figure 13). With informant 1, her eyes shifted consistently in saccades throughout the reading and she seemed interested in not missing anything of that was happening on the screen. This differs from informant 4 who only did this when he recognized the subject. Thus, we can assume that even a "text-loving" news reader can be engaged in an interactive article if it is produced as something recognizable.

"The text ends up in the land of invisibility"

Some informants find the text difficult to read as it sometimes disappears in the background image. Informant 8 said "The text ends up in the land of invisibility".

This may indicate that the text violates the design principle of visibility, even though the user chooses where to place the text when scrolling.

An informant has an ideal location for paragraphs

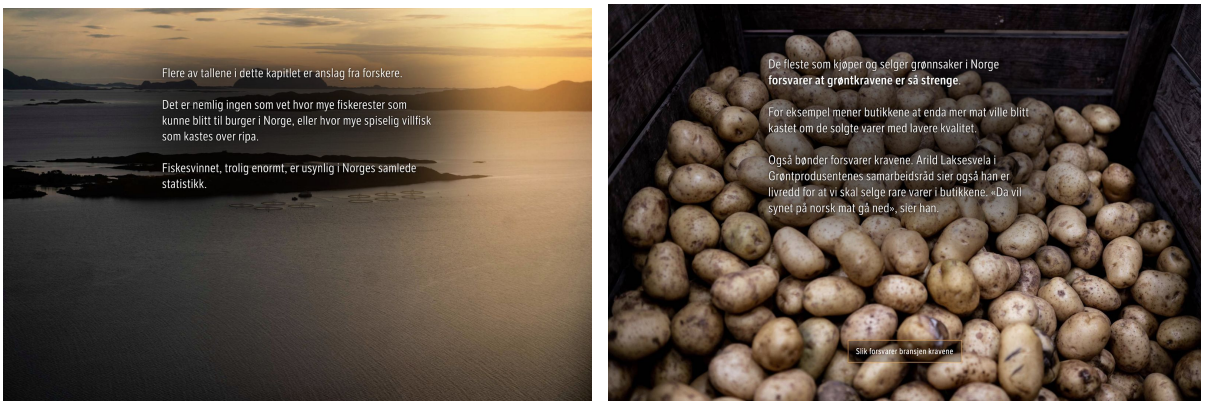

Figure 14: Informant 4 illustrates his ideal location for longer sections of text, high up on the page.

Through eye tracking, we saw that informant 4 tended to place the longer sections high on the screen regardless of the background (see Figure 14). We therefore assume that he has an ideal location for reading text on screen and that this may apply to others as well.

Entertaining video, but the parents does not learn much

The overall impression of the video "Climate economy with Knut Kvothe" is very different among the parents. Some people liked it well, pointing out that they thought the communication was entertaining. Nevertheless, several of the informants say that they are not left with so much knowledge after seeing it. Informant 3 says that the video gave her more questions than answers. Originally, the video was produced for NRK School, and is intended to be used in teaching for high school students. This makes parents out of the target audience, but we consider it critical that the video fails to teach adults about the topic. The video visualizes that private individuals can also pay for their CO2 emissions through climate quotas, but it does not explain how this contributes to reducing emissions. Therefore, the video almost meets the climate communication principle of conveying how the individual's actions affect the big picture.

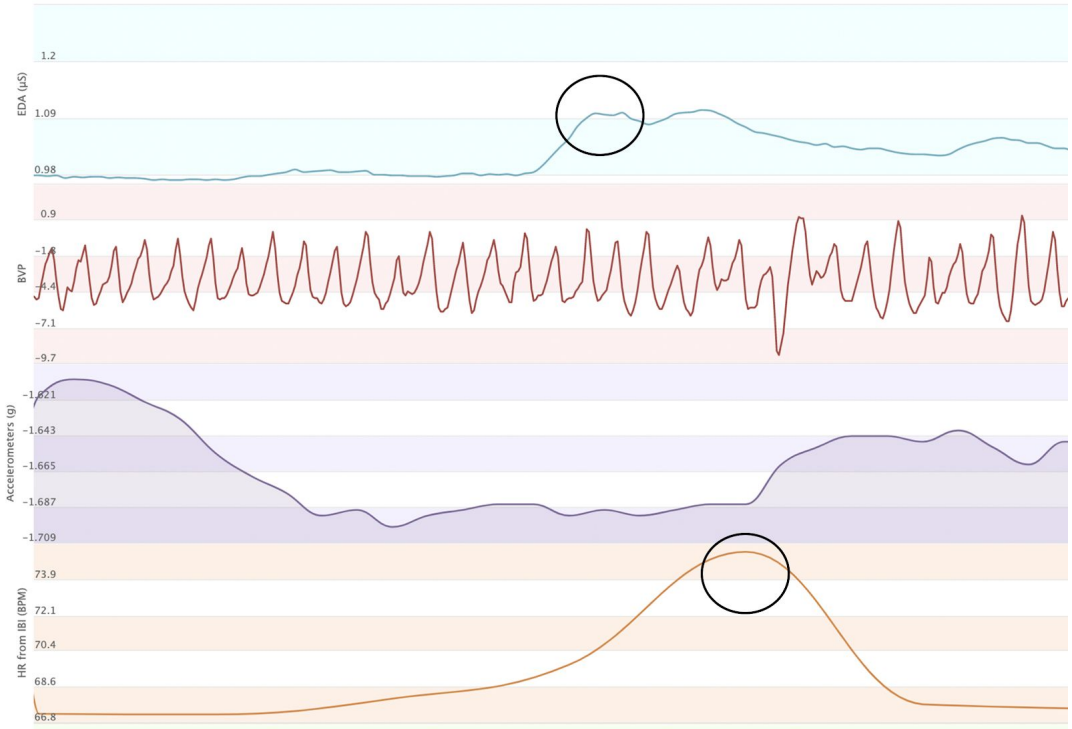

Figure 15: Showing data from informant 4. A slight increase in sweat of 0.11 and an increase in heart rate of 8.07 when the narrative voice in the video says that one can buy climate quotas.

Informant 4's physiological data showed impact on sweat and pulse when the narrative voice in the video says "It might be good for the conscience to buy some climate quotas if you fly a lot" (see Figure 15). The informant says: "[...] after watching the video, I still don't quite know what or how much a climate quota is. An important piece is missing here ". Based on this psychophysiological data, we assume that it may indicate that he was either stressed by being told to buy climate quota when he did not know what it was or that he might feel struck by the statement about flying a lot.

The video is too fast and too dependent on sound

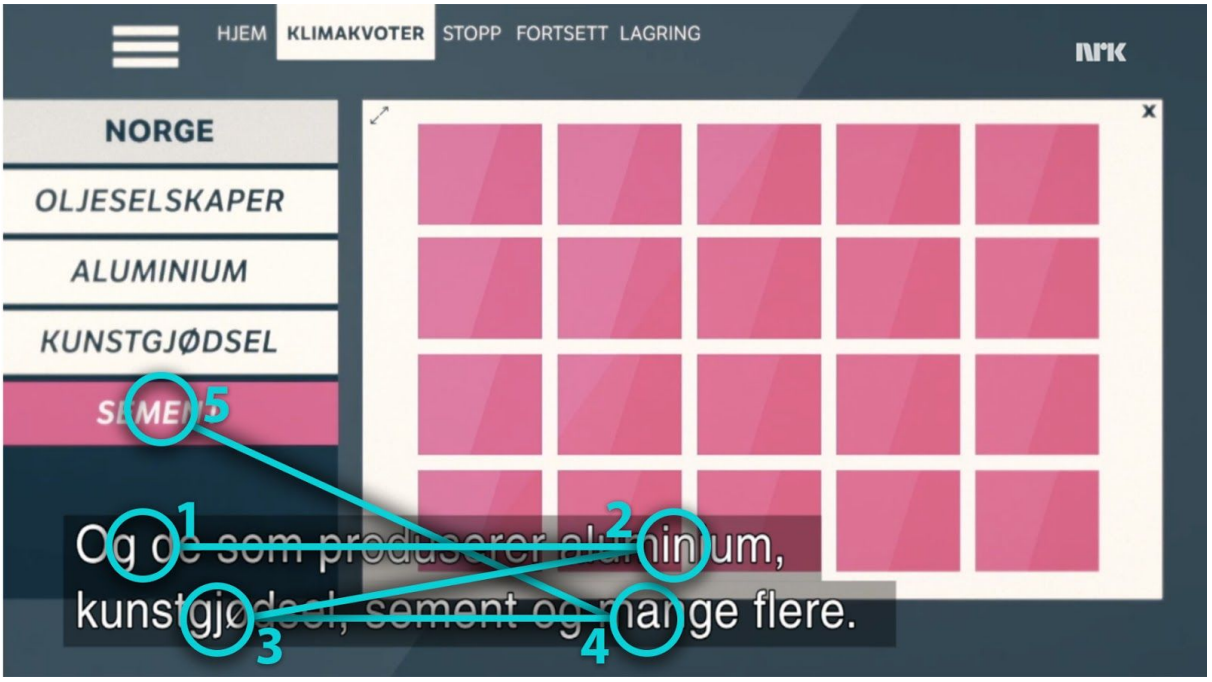

Figure 16: Screenshot from the video illustrating that here is a lot of text being shown at the same time. The informants never reads all the text on the left before the image changes.

Five out of eight informants mention that the video is far too fast, indicating that the video speed is not optimal. We also see this in the eye tracking results, as the informants are not able to read all of the information (see Figure 16). Several mentioned that this was a video they would need sound to understand, and that the narrator voice used so many instruments that it would have been a completely different video without it. This is a critical finding as the interviews revealed that most of the informants normally watch video without sound in their everyday life.

Too much is happening at once

There are many moving elements in the animation video. During the eye tracking, we see that the informants' gaze is drawn towards the moving elements. When the video has subtitles, there are more elements to focus on, making it harder for the eye to fixate.

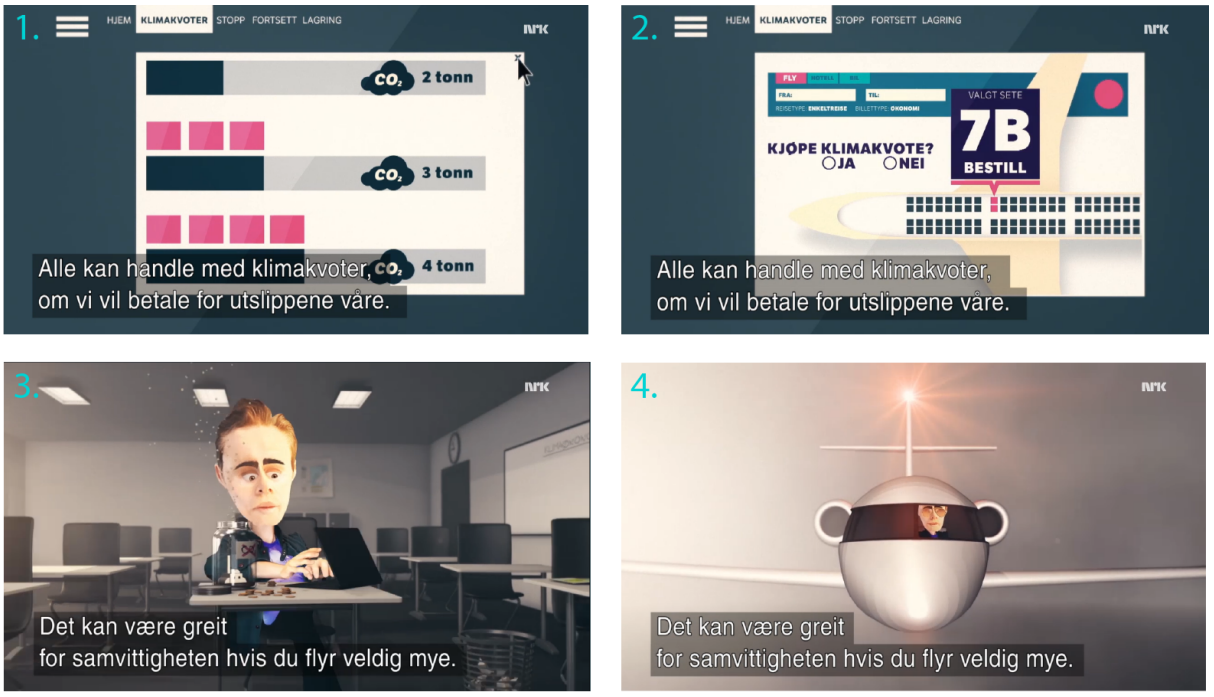

Figure 17: Displays the amount of information presented in the video during the time it takes the narrator to say two sentences.

Informant 6 says he became too busy with the animations, which caused some of the information to disappear. We therefore see that relevant information conflicts with movements elsewhere on the screen. This results in the viewer missing out on important information, such as the video explaining what a climate ratio is. We assume this may be because it presents a lot of new information and animation in a short time (See Figure 17). The video contains subtitles, narrative voices and animations with and without text.

Faces are eye-catching

Figure 18: Gaze plot informant 4

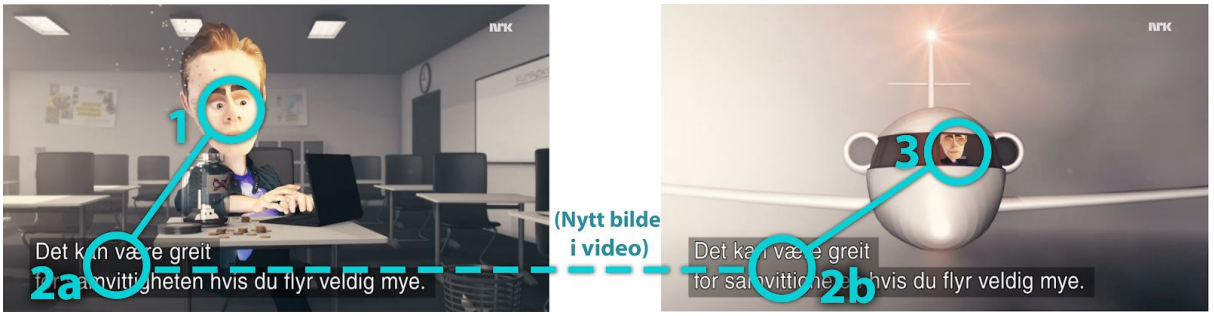

Figure 19: Gaze plot informant 1

In the video, it is clear that the parents' eyes are attracted to faces, even though it is an animated character. As shown in Figures 18 and 19, the informants gazes are searching for a face. They look at the main character first, before moving on to other elements such as text. This suggests that faces, also animated, are a powerful tool for catching the eye.

Skeptical about the use of animated characters

Several parents were positive that information was communicated through animations, and they especially liked the comparison of CO2 emissions between different countries.

Despite informant 7 saying that she liked the video as a genre for presenting climate journalism, she was skeptical of the use of animated characters rather than real people. She said, among other things, that "As a teacher I would like to say it would have a bigger effect with real images". She also said it was unfortunate to "[...] empower young people to create a climate for dummies". With this, we can assume that the animated characters give the video an unfortunate and childish feel.

Design implications

Based on our findings, we have made some suggestions for changes to the design of the article and the video to improve the communication of the content. We believe that these practical solutions and design implications will make the media content more understandable and enhance the user experience.

Division of content should be clear and navigable

To solve the challenge of users becoming impatient with a long article, the solution may be to reduce the length of the article by dividing it. As mentioned earlier, one informant pointed out that it seemed that the article consisted of several issues. This suggests that it may make sense to distribute the different themes across multiple articles in an article series with the same overall theme and visual profile. The article already has some sort of chapter breakdown, which could be a good starting point for this breakdown. By reducing the length of the article we believe the user will be left with a better impression.

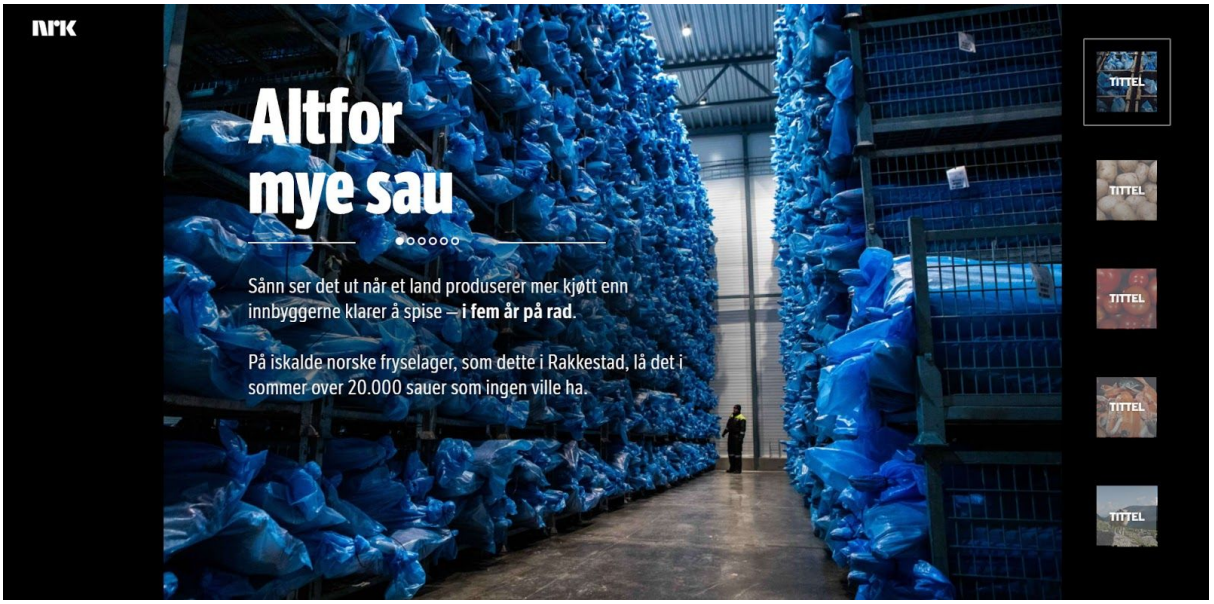

Figure 20: Simple sketch of what a navigation menu can look like.

An alternative solution is to make the article's chapter section visible in the form of a navigation menu with buttons. By navigation menu we mean a menu where the user can jump to specific chapters in the article for further reading. In Figure 20 we show how this can be done, the boxes on the page are clickable and will take you to a new chapter.

Then the user can easily navigate between the different topics and it becomes easier to pick up the matter again later if you do not have time to read the whole article in one session. This will make it easier for parents with a lot of disruptions in their everyday life to get all the content.

Text placement should be the same

Figure 21: Original screenshot of "The Great Food Waste" by NRK.

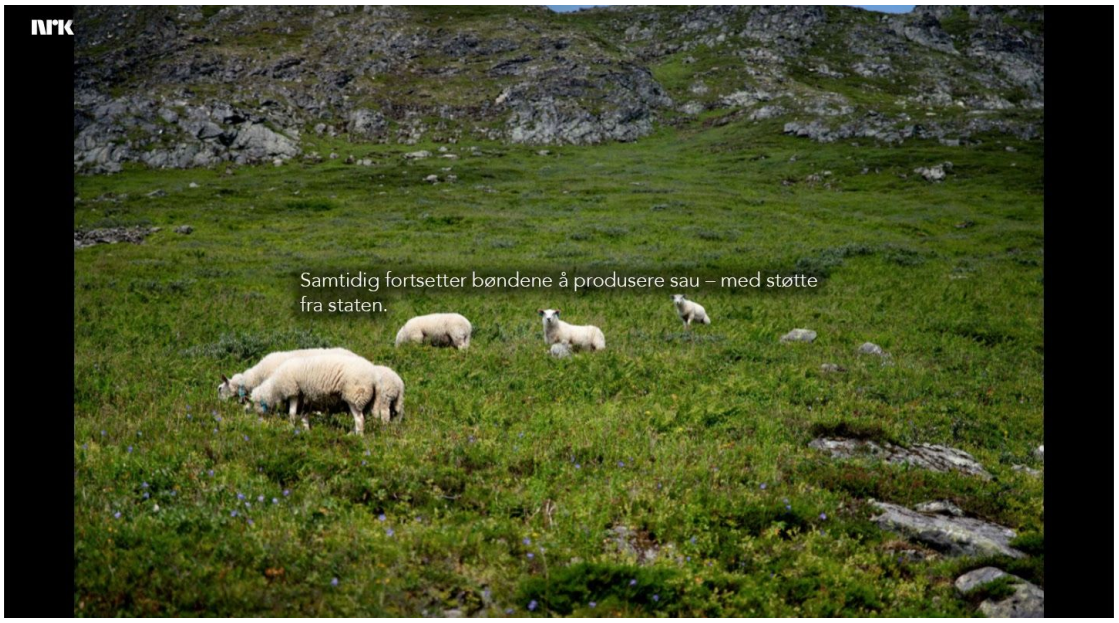

Figure 22: Example of how text can be visualized by using bigger contrast between the text and background image.

We suggest that all text be automatically placed in the same place on the screen to avoid much scrolling and low readability. The reader will still be able to scroll through the images, but the text will jump into place at a specific location. This allows the developer to place the text in advance where it will be easily visible. Regardless of the position of the text, visibility between text and background should be improved (See Figures 21 and 22). By placing a darker shadow area behind the text, the contrast will be improved even on light backgrounds. It is also important that text placement is consistent, as this will provide a better reading flow. The reader can then know where the gaze should be fixed further. This will solve the problem of low readability and at the same time fulfill the design principles of visibility and consistency.

Make information boxes more visible

Since most informants were positive about the information boxes, we propose that it makes sense to keep these in future designs. We still recommend increasing the size and color contrast of the buttons, as well as avoiding the use of these where there are videos in the background. By clearly introducing the reader to the first button with a little animation, one will make sure that the rest of the buttons are seen as well. By making these changes one will more fully fulfill the design principle of visibility.

In addition, using the same explanatory text on each button will make it easier for the reader to understand the function of the buttons, and the principle of affordability is fulfilled.

The video needs less information per minute

Several of the parents stated that the video was fast and difficult to understand. The video should communicate the information better without sound, as this is how the majority usually watch video. It was also difficult for them to get an understanding of the topic when a lot happened at the same time. We suggest slowing down the speed of the video or reducing the amount of information per minute. In this way, users are able to see, read and process information before it disappears. Avoiding the use of too much stimuli at the same time will reduce the amount of information. This will at the same time fulfill the principle of affordability as it will be more obvious what the video is trying to communicate.

Avoid animated characters in video

According to one of the principles of climate communication, it is effective to use real people in the visualization of climate journalism. Informant 2 also specifically stated that she prefers the use of real people rather than animated characters. We therefore suggest to limit the use of animated characters for the benefit of real people in a future design. Nevertheless, the informants responded positively to animation of the statistics themselves, so this should be kept in mind.

Conclusion

In this evaluation project we have examined and compared two different ways of presenting climate journalism. The purpose of the evaluation was to find out how parents perceive and react to the selected media content from NRK, and to advise on how such content can be improved in the future. Using subjective and objective methods such as eye tracking, physiological bracelets and semi-structured interviews, we have attempted to gain a better psychophysiological understanding of how parents with children under 16 respond to two kinds of stimuli; the article "The hidden food waste" and the video "Climate economy with Knut Kvothe".

By applying psychophysiological findings and linking them to the principles of design and climate communication, we have summarized some suggestions for changes.

1. The article is too long and should therefore be divided into several articles or clear chapters. Creating a navigation menu makes it easier for users to access the various chapters of the article.
2. The information boxes strengthen the credibility of the article, but they are not always seen and understood. By making the first information box visible, readers will better see and understand the rest of the boxes.
3. There is often a lot of scrolling and low contrast between text and background. Thus we suggest that the text should be located in the same place each time the user scrolls, and to increase the contrast between the text and the background in that area.
4. The video is too fast and has too much movement. The speed should therefore be lowered so that there is less information per minute. We also recommend using real people rather than animated characters.

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