GUIDELINES FOR CLIMATE CHANGE VISUALISATION COMMUNICATION

Bachelor Thesis

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Abstract

Human caused climate change is happening. Many organisations are trying to raise awareness and create engagement with the help of campaigns. Without clear guidelines for the visuals of these campaigns, the success cannot be guaranteed. To create the guidelines, climate change campaigns were researched as well as non-climate change related campaigns. The target group of young people aged 18-30 was chosen. Furthermore, a difference in climate change visuals targeting men and women was found. The list of guidelines that came from literature, was later tested. Twelve visuals were made, six good and six bad, based on the guidelines. The visuals were shown in a survey and the participants were asked questions to evaluate them. Afterwards, a more complete list of guidelines was made. Showing both the guidelines found in literature, those suggested by the survey respondents and which were supported by both.

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Chapter 1 - Introduction

1.1 Background & Challenges

"Human-caused climate change is happening" [1]

Worldwide it has been acknowledged that climate change is real, but action on climate change mitigation is scarce. Many people are aware, but few know the risks involved and how to help reduce it. In western countries, more than 75% of people are aware of climate change, in some countries even 90%. But of those 'Aware' only 50-69% sees climate change as a serious threat. Studies show that there are big differences in beliefs and concerns about climate change. These differences are based on geographic, gender, income, and age demographics. "… those in developing countries generally perceived climate change as a much greater threat … than did respondents in developed countries" [2], this has to do with the immediate treat climate change poses for them such as the rising water level or draught. Correlation between awareness and gender was also found, woman "were significantly more concerned about climate change than men". Within one country, income also has its effect on awareness. Compared to high-income, low-income individuals were less likely to be aware, however, they did have a greater concern about climate change. Concern was also influenced by demographics [3].
'Being aware of climate change' only means that people have noticed that the climate is different than how it used to be. A more important statistic is the amount of people that believe that climate change is human caused. Even though 97% of climate scientist have concluded that climate change is human-caused, the scientific consensus [4], [1]. According to Maibach, Myers and Leiserowitz [1], only 51% of the population of the United States of America knows about this consensus. More communication about this is key. Van der Linden et al. [4] found that "communicating the scientific consensus on human-caused climate change is an effective and depolarizing public engagement strategy".

1.2 Focus of This Project

However, this research is not about the best way of reducing climate change. The focus of this project will be about the visualisations used in climate change campaigns. Some well-known organisations in combating climate change are Greenpeace [5], ActionAid [6] and WWF [7]. Their campaigns could have success elements or elements that might be counterproductive. Without clear guidelines for what works and what does not in campaign visuals, the success of such campaigns is hard to predict. Previous research has looked at one single campaign or campaigns from just one organisation. The goal of this thesis is to research different key characteristics in climate change visuals that can be used to increase the effectiveness of climate change campaigns. This is done by evaluating contemporary research on the topic of campaigns that address behaviour, and climate change. That is why the research question will be:

> *What are the guidelines that campaign makers should consider when making a successful campaign visual?*

The following sub questions have been made:

> *What should the visual look like?*
> *What are the goals a campaign should focus on?*

What should the message on the visual state?
What are the underlaying theories that help in making it a successful campaign?

These questions tackle the important aspects of a campaign visual.

1.3 Outline of The Thesis

This thesis will start with a literature research. Looking at what has already been researched and concluded by others. Based on campaigns, climate change related and non-climate change related, the good and bad elements will be analysed and listed. After that, the target group, and considerations that come along with it, will be identified. In Chapter 3, the Methods and Techniques will be discussed. Followed by the process of making some test visuals and the Ideation of this process. In the Realization chapter, the visuals, survey questions and survey design process are discussed. For this, the use of contemporary research in the related fields is used. After that, there will be an Evaluation of the results from the survey. The results will be divided into quantitative results and qualitative. A summary of the conclusions from the Evaluation and an answer to the research questions will be presented in Chapter 7, Conclusion. In the Discussion and Future Work, the things that went right, wrong and what could have been done differently, will be reviewed, and discussed about. There will also be a suggestion for what future research should focus on.

Chapter 2 – Theoretical Framework

This chapter will be about what information can be found in research done by other people, to help with this research and in answering the research question. It will start with looking at campaigns that were analysed by other researchers. After that, it will focus on the specific target group this research will focus on. Focus will be on the basic goals of a campaign, how a visual should look, what message should be conveyed and what strategies and underlaying theories can be used.

2.1 State of The Art

It can be interesting to look at campaigns in other fields of expertise as well as campaigns for climate change, the elements they use for their visualisations, the theories they use for behaviour change, and the kind of communication and messages that work best for them. Multiple researchers have done investigation into these campaigns. This chapter will be a list of several campaigns that were analysed by different people. It will contain the elements that were found to be useful, help with achieving the goal and those elements that had negative effects. There is a big difference between topics, but general success components that occur in multiple of these campaigns can also be useful for climate change communication. Two of the examined studies are focused on climate change [8], [9]. Three studies are about health campaigns [10]–[12]. Others focus on several different topics, travel behaviour [13], cyber security [14], public relations [15], reducing red meat consumption [16] and aesthetics in data visualisation [17].

Clear messages and use of images

The use of images in campaigns can have great benefits. Images are great at explaining certain topics a lot faster than words. Jakus [15] says that visuals have the "ability to process information faster". However, the problem with trying to use images in climate change campaigns is that "you can't actually see global warming." [9] Some elements like temperature are difficult to show, as climate change is not always photographable. These element should be made visible and the impacts should be made clear [18]. It can be used to show the effects and change, for example separate images of a melting glacier over time. When placing these visuals at the actual location, it will be useful as it leaves an impression that will stay with them for a while. It will also motivate them to learn more about it [19]. An image is a powerful tool in grabbing attention, this paired with an eye-catching messages helps construct more effective visuals [13]. Aesthetics of an image are important, as it helps with bringing the message clearly to the viewer [9]. It can engage viewer in a "deeper level of interpretation" [17], promoting understanding.

Jakus [15] suggests additionally to minimize the text. However, with minimizing the text, the message should remain be clear. Especially since clear messages could help with the overall acceptance of the new behaviour [14]. This claim is backed up in scientific literature [11], [13], [17], [20].

Information for raising awareness

The first goal of a campaign could be to raise awareness about their topic, "as knowledge is a precondition of behaviour change" [12]. This is done by informing people on things such as the level of scientific consensus [20]. Increasing their knowledge is also helpful with the acceptance of climate science [20]. Recommended by Myers et al. [20], a visual should make use of numeric statements and the "estimation and reveal method" if possible. This entails that people are asked an estimate, and then it is revealed whether the estimation is correct or not. Using this method can make people remember it better. The use of normative wording was proven to be successful in a campaign for towel reuse in hotels [16]. When informed about their lack of knowledge, people generally want to learn more [20] but preferably by

their own choice and pace [19]. However, “merely presenting the scientific evidence for climate change is insufficient to increase engagement” [21].

Humour

Making use of humour is another strategy to raise awareness [22], as it can “extract essential information” [23] to make it more understandable and more interesting. Unfortunately, humour is not always beneficial. As it helps to raise awareness, it does not create engagement. Humour is personal and specific, as it depends on whether the viewer understands the joke [22]. Humour can also make the source less credible and downplay the severity of the issues [22].

Creating engagement

The second possible goal of a campaign is focusing on increasing engagement. Engagement can be increased by informing people of what actions they may take to reduce their impact on climate change [14]. Engaging them on a personal level is more likely to be effective. [24] These actions need to become the new standard and their current behaviour needs to be changed. Furthermore, engagement has to do with motivation and keeping the motivation. “Inconceivable solutions must be illustrated” [18] and showing the relevance of those solutions on the local environment can increase participation [11].

Removing barriers

One key concept for engagement is to remove the assumed barriers [13]. When making suggestions, they should “help to prevent the feared outcomes” [25]. With these barriers people will feel like they are unable to make any change, that their action is useless and will not make any difference. Some of these barriers are real and others are perceptual. First the barriers need to be identified [26]. After that, people need to be shown or told how it is possible to overcome or remove these barriers. It can be shown as “something ‘people like me’ have overcome” [18].

New behaviours

Even though using negative messaging might help in getting people’s attention and create some concern, it is not helpful in motivating them and might even create barriers to engagement [24]. Research performed by Leal Filho [27] shows to avoid focus on negative messages. They are a good way to make people aware but instead Filho suggests to also focus on what has already been achieved, the so to speak success projects. Putting emphasize on the positive aspects of the desired behaviour, and not on the negative elements of the current behaviour [13], [21], [28]. Greenpeace is also refocussing “its message to promoting solutions to the problem” [9]. Focusing on finding “a sense of connection with the causes and consequences of climate change in a positive manner” [24] will help someone to see the importance of climate change mitigation specifically on a local and personal scale. Encouraging people to take part in the right behaviour will also help inform those who are not aware of what the ‘right’ behaviour is [14].

Behaviour Change

There are many different strategies to encourage certain behaviours, especially within pro-environmental behaviour change. Of course, targeted messages are the most useful. But in general, the following strategies were found to help.

First of all, with the help of social marketing theory, unattractive behaviour can be made more attractive and engage people [26]. Another strategy to motivate people is to promote a new behaviour with benefits in multiple areas instead of solely focussing on the environmental benefits [29]. Completely opposite from this, is promoting behaviour focussing on everything but the climate benefits, and it still has an underlying benefit for the environment. For example, promoting money benefits [26] in energy saving behaviour, or

health benefits in reducing red meat consumption [29]. Bada et al. [14] suggest that specifically in Western countries it can help to focus on the personal benefits, as they have an individualistic culture. Promoting pro-environmental behaviours could also create a 'spillover effect'. This means that promoting one behaviour could have the positive effect of encouraging people to change some other behaviours as well [21], [29]. For instance, encouragement to use the car less could also lead people to go on fewer holidays by plane. However, promoting behaviour to reduce climate change can also have a negative spillover effect. When people engage in one positive behaviour, they feel like they "have earned the right to engage in other unsustainable behaviours" [26].

Using fear

Another way of changing people's intentions and behaviour towards climate change is the use of fear appeals [30]. They suggest avoiding low threat and instead focus on high threat and high efficacy. Furthermore, Nab, Jansma and Gosselt [31] found that "loss frames are more effective under conditions of high perceived risks". In Taiwan, the media has shown climate change as human caused, resulting in 90% awareness of its population. Their awareness might be high but they are not willing to make "significant changes of their lifestyles to alleviate the consequences of climate change". [30] When focussing on social issues like climate change, Boshoff and Toerlen [12] suggest to inform and caution.

However, the effectiveness of using fear in messages and images is criticized in various studies. Bada et al. [14], Boshoff and Toerlen [12], Corner et al. [21], Doyle [9] and Stern [25] suggest to not use fear. They say that it could have adverse effects and create behaviours that are not beneficial for fighting climate change. In a campaign for cyber security awareness [14], they found that "it could scare people who can least afford to take risks". Fear can also cause stress which could result in that the individual denies the treat [14], [24], [25]. Others can start to feel powerless [21]. Using fear in visuals could entail the use of images of floods, starving polar bears or forest fires. Doyle [9] says that certain images could create a distancing effect. Other images could leave someone "feeling susceptible to the treat" and they could become defensive when exposed to fear appeal messages [12]. This fear can be reduced by suggesting practical actions that can be taken [25].

Emotions

Certain messages create an emotional reaction, which could have benefits. Aschemann-Witzel et al. [11] and Boshoff and Toerlen [12] suggest to make use of these kinds of messages for emotional engagement. It can help with learning and enhance the creative mind [17]. In a campaign for hand hygiene in hospitals, providers were proud of their accomplishments, this helped with long-term compliance [10]. Specifically positive emotions were suggested to provide strength [21].

Credibility

Another element that can influence the success of the campaign, is to make sure that the campaign has high credibility [20]. This has to do with the credibility of the visual, the campaign makers or the source of the information [13]. Overtime, Greenpeace has gained high credibility with both the public and governments. They did this by their "commitment to the visual documentation of environmental destruction" [9]. For a campaign within a company, the success can also be determined by the level of support the leadership shows. [10] Nationwide, this might translate to the government showing their support and creating climate plans.

Feedback and familiarity

To make sure that people are kept engaged with the topic, repetition and feedback are key. With

repetition you create familiarity with a topic, which is important [13]. Seeing the information multiple times from different credible sources could "enhance the debiasing effectiveness" of that topic [20]. However, too much repetition is not effective. People get used to the message and image, and will overtime be less engaged [32]. Feedback can also help with engagement. In a campaign for hand hygiene [10], monthly feedback about obedience was given, which appealed to the competitive nature and helped to keep a certain level of commitment to the campaign. Bada et al. [14] states that when people want to change, feedback can help them stick to their new behaviour.

Make it local

Many current visuals make use of images from far away elements. These elements can be far away in the future, far away in space of distant places or even about entirely different species. This results in that people think that climate change does not have any influence on them but rather on those far away elements [33]. It is distant and unrelatable. It must be made clear that the viewer is impacted as well and that climate change is not just a faraway problem [18].

Making use of a more localized approach and view, is something Greenpeace has already been working with [9]. Their local campaigns have a more focussed message based on the worldwide campaign. This focusses on relevant topics for their area. Focussing on the local message is important [21], as it helps with a better "holistic understanding" [13] of the problem, seeing the relevance and consequences [24], which in turn helps with engagement [11]. For both cyber security [14] and hospital hand hygiene [10] it is important that the message fits the 'local' culture.

Individual or group targeting

It is widely known that campaign and visuals that are specifically made and tailored for one person, will help well. Making it targeted is useful [14]. In a campaign against smoking, it could entail figuring out who wants to change their current behaviour and who does not [26]. However, Corner and Randall [26] wonder whether it will work on a bigger scale, as individual targeting is a lot of work. At some point, trying to meet the specific needs of the viewer could conflict with the overall goal of the campaign. Some lifestyles are just not sustainable, trying to slightly change them would not have impact [26]. It would be more beneficial to make use of the social groups people have. Making targeted messages for these segments of the population is useful [28]. This could even help with engagement [21]. "Developing 'group norms'" [13] to have a basis on which climate change adaption can built.

To know which groups to specifically target, a more detailed research must be done to find out which group is best to target and that is best done.

2.2 Target group and segmentation

Every campaign is always specifically targeted towards one group with a certain demographic. Therefore, it was decided for this research to look at a specific group of people, and some subgroups within that to test some differences. The group of people will be based on their age. Young people, aged 18 till 30 years, are selected to do this research on. The subgroups within the target group young people, will be based on their gender and their climate change segmentation group.

2.2.1 Young people

Young people will be the future and targeting them is important [34]. The current westernized society is heavily based on behaviour that is not sustainable in the long run with climate change reduction in mind.

The climate policy decisions that are made now, will have the most influence on people that are young now [21]. The behaviours that are implied by these decisions, need to be portrayed to the public in the right way, to motivate them and engage them. Making sure that they are taught a sustainable lifestyle is important in reducing climate change. Teaching them a sustainable lifestyle with the right behaviour now will help them in the future.

It is vital that these messages are conveyed in the right way since young people are prone to climate anxiety [35], feeling hopeless, pessimism [34] and powerlessness [21]. It is best to focus on how humans can still adapt and reduce climate change, sending positive messages that are more localized [21]. Using messages with fear appeals are strongly advised against. Therefore, messages with the positive behaviour instilling hope can be "seen as vital" as it has a positive influence on engagement [21], [34]. As the brain of young people is still growing, they are at a crucial moment in their development. It is important to reduce any climate change stress they might experience as it could have negative effects in the long run, both mentally and physically [35].

The younger people are, the more they feel like they are capable of doing something. However, younger people have less "behavioural intentions" to change [28]. In general, youth have a lot of other things to worry about than just climate change. On the other hand, they do have more interest and concern in climate change than older generations [21]. Unfortunately, this worry is limited as they feel like climate change is happening in "'far away' places" only and they do not believe they are in any danger themselves [21].

Visuals targeting young people should make use of informative elements to raise awareness. This information should be about explaining the carbon footprint, telling people about the scientific consensus and the max 2°C temperature rise [21]. The message should be framed as a "contemporary concern requiring an immediate response", making use of easily understandable words [21]. Furthermore, making use of their social groups can help in awareness and engagement [21].

2.2.2 Gender difference

One of the subgroups is about the difference in gender. It was found that there is a difference between men and women with respect to climate change. Women generally show more concern than men [3], [21], [28], and have less confidence in science [33]. This concern results in a drive and motivation to reduce climate change. According to [28], women have less precise knowledge about how climate change works and what causes it. They suggest focusing on informing them to raise the general awareness of women. However, [33] found the opposite. According to McCright, women possess more knowledge about climate change than men, but they are less confident in their knowledge and their ability to act upon it. Men, on the other hand, would benefit from more motivational messages, suggesting them what actions to take [28].

2.2.3 Segmentation

The entire population can be divided into groups based on their beliefs and concerns about climate change, the climate segmentation groups. This is the process of segmentation. Maibach et al. [36] has made a segmentation specifically for climate change. These groups, sorted from least worried to most worried, are called; Dis-missive, Doubtful, Disengaged, Cautious, Concerned, Alarmed. The groups that will mostly be focussed on in this research are the Disengaged, Cautious, and Concerned. The Disengaged is the group that has not put any thought into climate change. They are most likely to change their opinion as they are currently unsure about where they stand. For the Cautious, it would be most beneficial to inform them and raise their awareness. The Concerned should be targeted with behaviour change and creating engagement.

These are the groups that will be most influenced upon seeing visuals and their opinions can change the most, if handled in the right way.

2.3 Summary

Based on the research on the guidelines from the campaigns above, a list of the guidelines can be made. This list can be seen in table 1, along with the campaigns that stated it, and the additional supporting sources. This list will help in the making of the visualisations.

Table 1: Guidelines of elements for good visuals, with sources.

	Campaigns	Additional sources
Clear message, easy to understand, pictures, minimize text	[9], [11], [13], [14], [15], [17]	[18], [19], [20]
Information for raising awareness	[9], [16]	[16]–[18],
Humour		[22], [23]
Raising engagement	[8], [11]	[18], [24]
Remove perceptual barriers	[13]	[18], [25], [26]
New behaviours	[9], [13], [14]	[21], [24], [27], [28]
Behaviour Change, social marketing theory, multiple motives, spill over effect	[14]	[21], [26], [29]
Do not use fear	[9], [12], [14]	[21], [24], [25], [30], [31]
Sources should have credibility	[9], [10], [13]	[20]
Feedback and familiarity	[10], [13], [14]	[20]
Emotions	[10], [11], [12], [17]	[21]
Make it local	[9], [10], [11], [13], [14]	[18], [21], [24], [33]
Individual or group targeting	[13], [14]	[21], [26], [28]
Young people		[21], [28], [34], [35]
Men, women difference	[3]	[21], [28], [33]
Segmentation		[36]

Chapter 3 - Methods and Techniques

In this chapter, it will shortly be explained what steps are going to be taken. This is discussed per chapter that will follow.

3.1 Ideation

Based on the research discussed in Chapter 2, it has been decided to focus on a target group with an age from 18 - 30 years old. There will be made a distinction between visuals targeted specifically at women and at men. Men will receive more motivational message with clear actions they can take. For women, more informational messages are made.

The supervisor had suggested to make twelve visuals to test the guidelines that were found in Chapter 2. The visuals will be divided into two groups. Six visuals are made that are classified as 'the good' and six visuals made that are classified as 'the bad'. Out of the six 'good' visuals, the first three will be made for women, and the other three will be made for men.

A list was made with topics of climate change and related. These topics include the suggested topics for young people; the scientific consensus, the carbon footprint, 1.5°C temperature rise. Others were topics that are common for climate change visuals. All the topics are the scientific consensus, carbon footprint, 1.5°C temperature rise, food wasted, eating less meat, transport and CO_2 levels, recycling, saving water, using less electricity, eat vegan, take your own tote bag, using less paper, flooding, drought. Good and bad visuals will be searched for with the help of Google Images [37].

3.2 Realization

The images that were found online, will either be used directly or as inspiration to make the final visuals. The visuals will be made using Microsoft PowerPoint [38]. The images will be imported, and the tools of PowerPoint will be used to create the visuals. To save the final version as an image, Microsoft Snipping Tool [39] will be used to make a partial screenshot.

For making the survey, it has been decided to use Google Forms [40].

3.3 Evaluation

To analyse all the data from the survey, Microsoft Excel [41] is used. After all the answers were merged into one Excel file, a thorough analysis of the data was done. The results will be divided into qualitative results, full answers, and quantitative results, numerical data. The full answers will all be read and used for the evaluation. The numerical data will be used to make graphs and tables to get better insight into the results.

Chapter 4 – Ideation

This chapter will detail the process and different ideation phases that happened when creating visuals based on the guidelines.

The search started with a general search for 'climate change campaign' and 'global warming campaign', and some variation of those two. Then campaigns by Greenpeace [5], ActionAid [6] and WWF [7] were explored. Inspiration was taken from these well-known climate organisations, as they have many climate change campaign visuals. Later the search continued by using the list of topics from Chapter 3.1. The images that were found and deemed fit for the premise of this research, were saved, and sorted into folders. Due to copyright, these images cannot be shown here or used in the survey and will only be used as inspiration. Of those visuals, twelve have been selected. Six visuals that were 'good' and six visuals that were 'bad'. They were categorised based upon the guidelines found in Chapter 2, listed in table 1. These twelve were shown to the supervisor, who did not approve all the visuals for use at first.

After some iteration, a final selection of appropriate visuals has been selected and approved. There are some self-made visuals and others found online. The visuals found online will shortly be mentioned. For a visual about the 1.5 °C vs 2 °C temperature rise, [42] was found. A visual about food waste [43]. A visual about public transport [44]. A visual about eating less meat inspired by two separate visuals [45], [46]. A visual about growing fruits in odd locations [47]. A visual about forest fires [48]. A visual about a possible lack of ice cream in the future [49]. A visual about polar bears with melting ice [50].

Unfortunately, due to copyright, those images could not be used for this research. Instead, it was decided to use images that are similar and remake all the visuals. Images from Google Images Creative Commons License [51] were selected to remake the visuals.
The first three good visuals are specifically targeted towards women:

- V1: A visual about the 1.5 °C vs 2 °C temperature rise.
- V2: A visual about CO_2 levels and the scientific consensus, had been created with [52] and [53].
- V3: Visual 3 is about food waste [54].

The next three good visuals are specifically made for men.

- V4: A visual about public transport with a bus [55].
- V5: A visual that suggests eating less meat.
- V6: A visual that tells the view to reduce reuse recycle [56].

The next six visuals are the bad visuals:

- V7: A visual about growing bananas in odd locations [57].
- V8: Visual 8 is about forest fires [58].
- V9: A visual about two different melting glaciers [59], [60].
- V10: The next visual is about a possible lack of ice cream in the future [61].
- V11: Visual 11 is about a sad polar bear on ice [62].
- V12: The last visual is about flooded streets [63].

All these images will be used to make visuals. After that, the visuals will be used to create an online survey where the guidelines will be tested.

Chapter 5 – Realization

In this chapter, the used visuals will be discussed. Furthermore, the questions are created, and the survey is made, and all the implications that come along with it, are explained.

5.1 Making the visuals.

The guidelines that are used for the visuals are shortly summed up here. Good visuals make use of pictures to grab attention, minimize the amount of text and give a clear message. Visuals that target awareness should use information that came from a credible source. When the goal is to create engagement, the message should clearly describe what goal to achieve and how, preferably with emphasis on the positive behaviour. This will remove perceptual barriers. Underlaying behaviour change theories will help, such as social marketing theory, multiple motives, or secret motives and the positive spillover effect. Repetition and feedback will help with familiarity and acceptance. Making use of emotions will help with engagement. When the campaigns target local areas, connections of the viewer will help with engagement. Focussing on social groups will help with this as well. If raising awareness is the only goal of a campaign, fear and humour could be used. However, it is strongly advised against as it could have adverse effects.

For women, it is advised to inform about climate change and the underlaying science. While for men, it is advised to have clear messages of what actions to take. Targeting young people specifically should focus on both raising awareness and engagement.

In the next part, all the visuals will be divided into the good and bad groups and shown accordingly. The guidelines that each of these visuals uses will be discussed shortly along with it. Of course, each good visual has elements that are less good, and the other way around, each bad visual has elements that might be good. These visuals are chosen based upon the fact that either the good or bad will outweigh the other. So, a good visual has more good than bad elements, and a bad visual has more bad than good elements. Only the good part of the good will be discussed, and only the bad part of the bad.

5.1.1 The good

These visuals all have elements that are considered as a good thing to use in the visual. However, there is no visual that uses all the guidelines perfectly. Visuals 1 till 3 are visuals that are specifically made to target the female audience. Visuals 4 till 6 are specifically made to target the male audience.

5.1.1.1 Visual 1: The 1.5°C vs. 2°C temperature rise

The visual that can be seen in figure 1, is about the difference in 1.5°C and 2°C temperature rise. Information about this is specifically targeted towards women. This visual makes use of information to raise awareness, using true data. Many of these topics are close by and relatable. Fear has not been used. There are symbols and colours to grab attention.

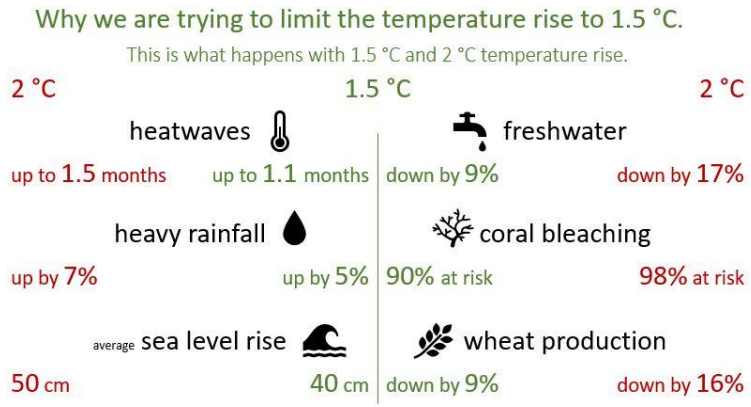

Figure 1: Good visual: the 1.5°C vs. 2°C temperature rise. Source: inspired [42].

5.1.1.2 Visual 2: The CO_2 levels over time and the scientific consensus

This visual in figure 2, makes use of images and graphs. Using information to raise awareness and images for a clearer explanation of the data. It does not use fear. This topic was specifically chosen to target women.

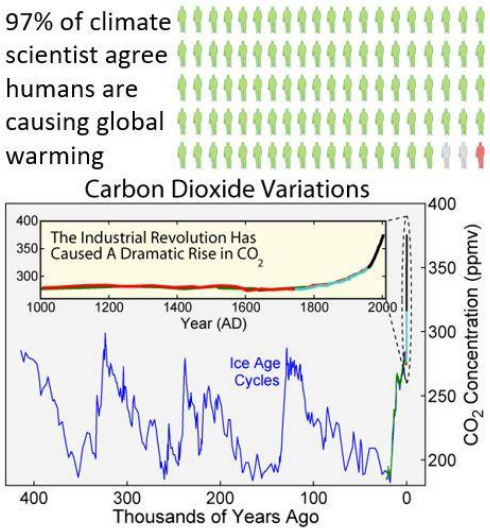

Figure 2: Good visual: the CO2 levels over time and the scientific consensus. Source: adapted [52], [53].

5.1.1.3 Visual 3: The food wasted by Dutch people

In figure 3, visual 3 can be seen which is informing the viewer about the average amount of food waste a Dutch person makes each year. This visual has some clear information, a message of what the viewer should do using normative wording and a credible source to go to for more information. It does not scare. There is an image that corresponds to the text and it helps to grab attention. This visual is more of a hybrid between female and male. As it uses information to make the viewer aware, it also has a quote with a

suggestion for positive behaviour to create engagement. This helps with removing perceptual barriers. This visual uses the behaviour change technique of secret motives, as there is no clear link to climate change.

Figure 3: Good visual: the food wasted by Dutch people. Source: inspired by [43], adapted from [54].

5.1.1.4 Visual 4: The bus

In figure 4 below, an English bus with some text written on the side can be seen. It informs people but at the same time encourages them in doing the right thing, this again is more of a hybrid between female and male. It removes some perceptual barriers there could have been. This ad is targeted locally and will reach a wide range of audience. Since it is such a bold black visual with white letters on the side of a red bus, it catches your eye.

Figure 4: Good visual: a bus with text on the side. Source: inspired by [44], adapted from [55].

5.1.1.5 Visual 5: Eat less meat

Visual 5 suggests a positive behaviour as a small suggestion, with a clear message with a minimized amount of text. Uses an encouraging quote that even small things matter, which helps to remove perceptual barriers. It could also cause a positive spillover effect. This visual is specifically targeted towards men. Visual 5 can be seen in figure 5.

Figure 5: Good visual: eat less meat, go meatless once a week. Source: inspired [45], [46].

5.1.1.6 Visual 6: Reduce, reuse, recycle

This visual uses familiarity of the topic and repetition to create engagement. In figure 6, the visual can be seen using a clear message to convey the topic with minimized text. It grabs your attention with the green and white colour contrast. It suggests a positive behaviour. This visual is specifically targeted towards men.

Figure 6: Good visual: reduce, reuse, recycle. Source: adapted [56].

5.1.2 The bad

In this section the bad visuals will be shown and shortly discussed. Often, they make use of the opposite of what the good visuals use. They make use of fear. Do not have a clear message of what action the viewer can take, instead only tell that actions must be taken now but not specifically what action and how. Some of the visuals make use of humour, which has proven to raise awareness but not engagement. Other visuals can be unthinkable, far away in space or in time and unrelatable. The information is not based on any science and there is no credible source.

5.1.2.1 Visual 7: The Swedish bananas

Visual 7 can be seen in figure 7. This visual uses humour, but in a vague way so that the viewer really needs to read it properly. The bananas are being cultivated in the odd location Sweden. There is no clear action which can be taken but also no information given.

Figure 7: Bad visual: bananas cultivated in Sweden. Source: inspired by [47], adapted from [57].

5.1.2.2 Visual 8: The forest fires

Visual 8 uses fear in the wake of a forest fires, it can be seen figure 8. It tells to stop global warming but no clear action of how. Forest fires could be distant to some. The colours and aesthetics used are not useful for the visual as they are unprofessional.

Figure 8: Bad visual: forest fires. Source: inspired by [48], adapted from [58].

5.1.2.3 Visual 9: The melting glaciers

In figure 9, visual 9 can be seen. The images are not relatable for many, and distant. There is no clear message for action. Furthermore, there is no source that backs these claims up. The statements could scare people. The statement about skiing is for a specific and unrelatable for many.

Figure 9: Bad visual: melting glaciers in Switzerland and Norway. Source: adapted from [59], [60].

5.1.2.4 Visual 10: The ice cream

Visual 10 in figure 10 makes us of humour. This visual, again, is not based on any science. The information is not realistic. It does not tell a clear action to take.

Figure 10: Bad visual: ice cream shortage due to global warming. Source: inspired by [49], adapted from [61].

5.1.2.5 Visual 11: The polar bear

In figure 11, visual 11 contains a skinny polar bear. It uses fear. There is no clear message of what action to take. What is happening is far away and unrelatable.

Figure 11: Bad visual: polar bear. Source: inspired by [50], adapted from [62].

5.1.2.6 Visual 12: The water in the streets

The things seen in figure 12 might seem slightly unrealistic to some people as they have never experienced flooding. Visual 12 makes use of fear, calls for action but not specifically what action. No source is used, and the information is not based on science.

Figure 12: Bad visual: water in the streets. Source: adapted from [63].

5.1.3 Summary

A summary of the guidelines per visual was made. These can be seen in table 2 and 3. Table 3 is specifically for the bad visuals. Some guidelines have the opposite next to it, to make clear what makes it a bad visual. With the visuals, a survey has been made to test these guidelines.

Table 2: Guidelines of elements used in the good visuals.

Visuals: F=female, H=hybrid, M=male:	1 F	2 F	3 H	4 H	5 M	6 M
Clear message			V		V	V
Easy to understand			V		V	V
Pictures for showing impact on world			V			
Grabbing attention	V		V	V	V	V
Minimized text		V	V		V	V
Information for raising awareness	V	V	V	V		
Make use of numeric statements, graphs	V	V	V	V		
Humour						
Raising engagement			V	V	V	V
Remove perceptual barriers			V	V	V	V
New behaviours, what action to take, positive			V	V	V	V
Behaviour Change, social marketing theory, multiple motives, spill over effect			V	V	V	V
Do not use fear	V	V	V	V	V	V
Sources should have credibility			V			
Feedback and familiarity						V
Emotions						

Make it local, not distant	V			V		
Group targeting				V		
Aesthetics, colours, fonts, symbols	V			V	V	V

Table 3: Guidelines of elements used in the bad visuals.

Visuals	7	8	9	10	11	12
Clear message		V				
Easy to understand → not easy	V			V		
Pictures for showing impact on world		V	V		V	V
Grabbing attention	V					
Minimized text	V	V			V	V
Information for raising awareness						
Make use of numeric statements, graphs						
Humour	V			V		
Raising engagement						
Remove perceptual barriers						
New behaviours → no clear action	V	V	V	V	V	V
Behaviour Change, social marketing theory, multiple motives, spill over effect						
Do not use fear → fear		V			V	V
Sources should have credibility → no source			V	V		
Feedback and familiarity					V	
Emotions						
Make it local → distant in time, space, species		V	V		V	V
Group targeting → unrelatable to many			V			V
Aesthetics → not aesthetically pleasing		V	V			V

5.2 Making the questions

After making the visualisations, the questions for the respondents were made. The first part of the questions are general questions which allow for insight into the demographics of the participant. Knowing whether they fit into the target group and being able to sort them into their subgroup. The questions are about age, gender, level of education, their level of believe and concern about climate change, and their level of effort to reduce climate change. For each of the visuals that the participants will see, they receive four questions. Afterwards, there are some final questions to test the impact of the visuals and some final thoughts. To make sure that the participants will not be biased, they will not be informed about the distinction between 'bad' visuals and 'good' visuals.

It was decided to give the participants mandatory as well as voluntary questions. By doing this, it is an attempt to prevent a decline in quality of the answers over time. When everything is mandatory, the motivation to answer goes down along with the quality of the answers [64]. All the general questions were mandatory, all the grading questions, questions 1 & 2 of the visual part, as well as all the final questions.

The only questions which were voluntary are the questions why a certain visual is useful (or not) for reaching the goals of the research.

5.2.1 General questions

General question 1: What year were you born?

This question is relevant since one of the target group segmentation is based on age. This research mainly focusses on "young people" from the age of 18-30, this translates to 1990-2002. This question is open.

General question 2: What is your gender?

This question is put in because certain sources talk about a difference in gender. This question had the options; female, male, other, prefer not to say.

General question 3: What is your highest level of education? (Dutch level in between brackets)

This question is used to gain insight into the participants. To see whether the sample will be a good representation of the population. The options are:
Primary education (basisschool)
Middle school
High school (middelbare school)
College (mbo)
University, bachelor (hbo en wo)
University, master
University, doctor.

General question 4: Do you believe climate change is happening?
General question 5: How concerned are you about climate change?

Based on the answers to these questions, it can be determined in which climate change segmentation group people must be classified. For both questions, they were given the numbers 1-Definitely not till 5-Definitely yes.

General question 6: Do you take any actions in an effort to reduce climate change?

The results for this question will be used in combination with *final question 3*. The options are numbers from 1-Not really till 5-Definitely yes. The difference between the numbers of this question and *final question 3*, shows the influence of the visuals.

5.2.2 Visuals questions

We will be showing some visuals that could be campaign posters for climate change.

Visual question 1: What grade would you give this visual?

This question will give a general estimation of what the person thinks of the visual. They can share their opinion of the visual by giving a grade from 1-Bad till 5-Good.

We want to raise awareness and engagement, and motivate people to take action against climate change.

Visual question 2: How helpful do you think this visual is with reaching our goals?

The possible answer is a grade from 1-Not helpful till 5-Very helpful.

Visual question 3: What elements of the visual are useful for reaching our goals?
Visual question 4: What elements of the visual are not useful for reaching our goals?

These questions were asked to get qualitative results and feedback on the visuals. Anything could be answered.

5.2.3 Final questions

Final question 1: After seeing these visuals, would you say that your opinion on climate change has changed, and why?
It is not expected that their opinion about climate change has changed only with the visuals. But it is still interesting to ask, both for the participant and for the researcher.

Final question 2: What visual stood out to you the most? (rough description of what you saw)
This question was asked to see which visual had the most impact and had stayed in their memories. With it can be tested whether people might still think about it afterwards and hopefully do something with it.

Final question 3: Do you plan to take any actions in an effort to reduce climate change?
The results for this question will be used in combination with *general question 6*. The options are numbers from 1-Definitely not till 5-Definitely yes. The difference between the numbers of this question and *general question 6*, shows the influence of the visuals.

5.3 Making the survey

To inform the participants as well as possible, the survey starts with the information brochure (Appendix A.1). This informs the participant about the research to which they will add, the basic rules for this survey, privacy, how long participation will approximately take and who to contact in case of questions. To give clarity about the voluntary side of participation and giving consent that their information is used for research, a consent form has been made (Appendix A.2).
Since everything is online, the participant is unable to sign the consent form with an autograph on paper. To make sure that true consent is given, the participant must agree with two different statements, “I give consent” and “I will fill in the survey now”. By using two statements, the viewer must properly read what is asked and cannot accidently ‘give consent’ by pressing a button on accident.
The participants are informed that they will be shown some visuals, that those visuals could be used as campaign posters and their opinion is asked. However, during the whole survey the participant is not informed of the differentiation between good and bad visuals. This was done to make sure they are unbiased when giving answers.

There are twelve visuals and each visual has four questions. To make sure that the participant does not lose interest throughout the survey, it was decided that every participant would get to see four different visuals. This would be two visuals of ‘the bad’ and two visuals of ‘the good’, specifically one created for females and one for males. These four visuals had to be assigned to the participant in a way that would be as non-biased as possible. However, the system that is going to be used for the survey, Google Forms [40], does not have a ‘Random assignment’ function. Therefore, general question 7 was added.

General question 7: Choose a random number from 1 till 6.

The participants are free to choose any number and a set of four visuals will be shown afterwards. The distribution of the visuals can be seen in table 4. Unfortunately, there could be a risk with using this method. Some numbers might be chosen more often than others.

Table 4: What visuals were shown, based on the chosen number.

Chosen number	The good, male	The bad	The good, female	The bad
1	v5	v7	v3	v8
2	v5	v8	v2	v9
3	v4	v9	v2	v10
4	v4	v10	v1	v11
5	v6	v11	v1	v12
6	v6	v12	v3	v7

In table 5, the segmentation groups, based on the beliefs and concerns about climate change, can be seen. The participant was asked two general questions:

General question 4: Do you believe climate change is happening?
General question 5: How concerned are you about climate change?

With the possible answers of a grade from 1 – 5. In the table the answers to GQ4 can be seen on the left side and GQ5 at the top. The yellow-coloured groups in the middle are the people that fall into the climate segments of Disengaged, Cautious and Concerned. These are the people that will mostly be focussed on with the analysis.

Table 5: Showing the specific segmentation groups that will be used.

Believe\Concern	1	2	3	4	5
1	1 1	1 2	1 3	1 4	1 5
2	2 1	2 2	2 3	2 4	2 5
3	3 1	3 2	3 3	3 4	3 5
4	4 1	4 2	4 3	4 4	4 5
5	5 1	5 2	5 3	5 4	5 5

The survey was sent out on the 12th of January 2021. This was done by sending the link of the survey to friends of the researcher, who were kindly asked to fill in the survey and sent it to some of their friends as well. This could result in biased data, as friends from friends often have the same beliefs, age, and level of education. However, it was also sent to housemates and fellow students, which could lead to a more even distribution that is less biased.

Chapter 6 – Evaluation

This chapter will be about analysing the data that was obtained with the survey. First the general questions, apart from GQ 6, will be analysed with the gathered data. Followed by the quantitative answers. And lastly, the qualitative answers.

6.1 General analysis

In total 97 responses were given which is a big enough sample size N to do a numerical analysis with. The answers were filtered based on the age of the participants in order to filter out the responses outside the target group of 1990-2002. This leaves a total of 90 responses. Two people did not answer the question about their age in the right way. One person answered "Germany" and the other answered "India". They might have read the question as "Where are you born?" as the question was "What year were you born?". These two are given the benefit of the doubt and included in the 90 responses. Out of these 90 participants, 39 were males, 48 females, 2 'other' and 1 person who preferred not to share their gender.

The expectation that no number in GQ7 would be chosen approximately the same amount, was correct as can be seen in figure 13. However, it was not expected that the distribution would be this skewed. Number 1, 2 and 6 were each chosen six times. While the other numbers were chosen substantially more times. This resulted in an uneven distribution of the visuals, hence some visuals, for example Visual 4, has 55 responses. While others like visual 5 only had 12 responses. This will result in that some answers and percentages cannot be taken as definite or compared, as a sample size of 12 is too small to be compared with a sample size of 55.

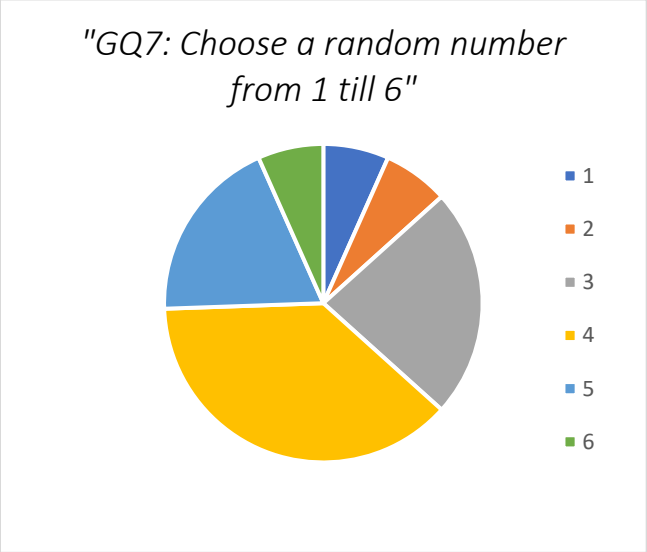

Figure 13: The percentage of how often each 'random number' is chosen.

To make sure that there was an even distribution of people from various levels of education, and a good representation of the population, "*General question 3: What is your highest level of education?",* was asked. Unfortunately, the question was not asked in an unambiguous clear way and the answers are not representative of the people that answered. Some filled in their finished level of education, while others answered what they are currently studying. Another reason why there was not such a wide spread of education level is because of how the survey was distributed. Friends from the researcher and friends from those friends often have the same level of education. Therefore, nothing can be said about the

representation of this survey and no conclusions can be made for the entire population within this age group.

The next problematic element which influences the results of the survey are the segmentation groups. The research was intended to focus on the people in the segmentation groups Disengaged, Cautious and Concerned. These people would be determined by the answers to questions GQ4 believe and GQ5 concern. The groups can be seen in table 5. Unfortunately, as can be seen in figure 14, there were not a lot of reactions within the groups ranging from 2 1 till 4 4. In total only 12 reaction. Therefore, doing a numerical analysis is valuable as no conclusion can be made based upon this group.

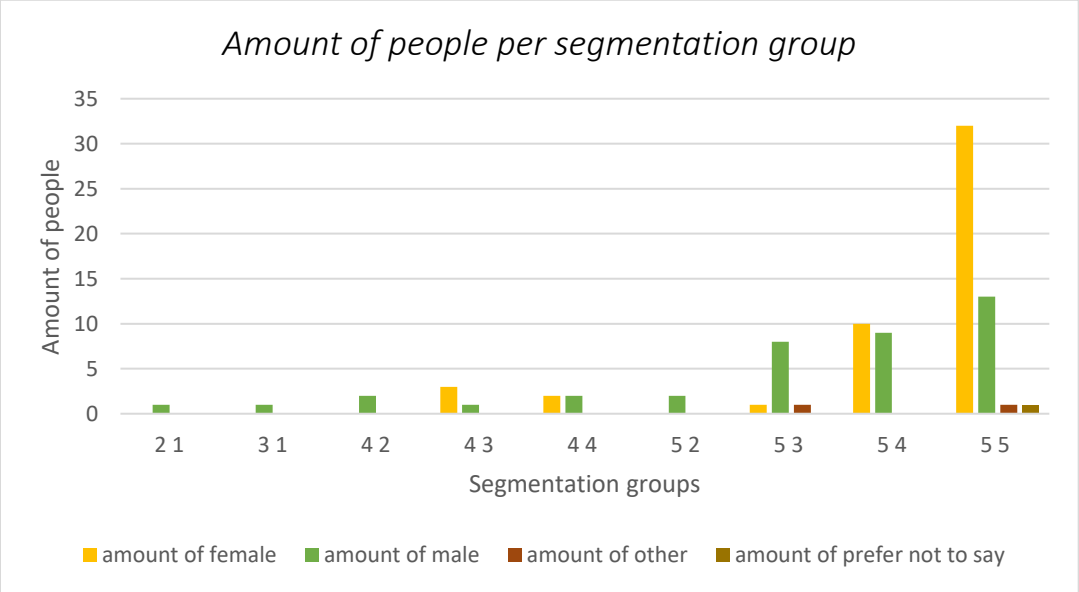

Figure 14: Amount of people per segmentation group

All the other questions can be divided into numerical and qualitative answers. The questions with numerical answers are: VQ1 & VQ2 about the grades the respondents gave, FQ2 about the visual that stood out the most, and GQ6 & FQ3 about their effort to reduce climate change. The questions with qualitative answers have full sentences as answers. These are: VQ3 & VQ4 about the useful and not useful elements of the visual, and FQ1 about whether their opinion changed.

6.2 Numerical answers and analysis

The questions that had a scale from 1-5 as possible options for answers, will be analysed in the upcoming chapter. The answers of each of the participants can be compared with one another. Besides, they can be divided into groups to draw better conclusions. The analysis of the numerical questions is split up in four sections. First the general grade given to the visual based on the following question:

Visual question 1: What grade would you give this visual?

The second part will go into the answers related to the question:

Visual question 2: How helpful do you think this visual is with reaching our goals?

Subsequently, the two questions about taking actions are analysed and the results compared. The two question are:

> *General question 6: Do you take any actions in an effort to reduce climate change?*
> *Final question 3: Do you plan to take any actions in an effort to reduce climate change?*

The final analysis is done about visual that stood out the most based on the question:

> *Final question 2: What visual stood out to you the most?*

6.2.1 Grading the visuals

The expectation was that there would be positive reaction on the visuals 1 till 6 because those were the good visuals. And more criticism on the visuals 7 till 12, because these were the bad visuals. Next to that, it was expected that there would be a clear distinction between 'the good' and 'the bad' visuals. However, this is not the case as can be seen in figure 15 till 18 and figure 19 till 22. All the colours represent the different visuals. The cross, in the middle of each boxplot, represents the average given to that visual. The dots are the outliers, in this the grade of which only one was given.

6.2.1.1 Visual question 1

No visual in particular, or group of visuals, stands out. Figure 15 is about all genders, figure 16 is about the answers from women, figure 17 about men, and figure 18 has the answers of both 'other' and 'prefer not to say'. As figure 18 only has 3 responses, no conclusions will be made about them, but they will still be shown. Figures 15 till 18 each show a boxplot of the grades given per visual. On the y-axes, the grades given with possible option from 1 till 5.

The expected difference between female and male is also barely visible. It was expected that females would give higher grades to visuals 1 till 3, and males would give higher grades to visuals 4 till 6. The contrary is true.

Of 'the good', visual 3 and 6 are doing well, looking at all genders. Visual 3 being about food waste, and visual 6 has the message of reduce, reuse, recycle. For women, visual 3 is graded the highest with an average of 3.75, while for men, visual 1 and 3 were graded high with an average of 3.17 and 3.5, respectively. This is interesting as those visuals were directed primarily at women. Visuals 1 and 2 are rated poorly by females, and visual 5 and 6 by males. Visual 1 is about the temperature rise, visual 2 about the CO_2 levels, visual 5 promotes to eat less meat and visual 6 suggest to reduce, reuse and recycle.

Of 'the bad', visuals 10, 11 and 12 seem to have done well with average grades of 3.3, 3.8 and 3.3. Visual 10 was about ice cream, visual 11 had the image of the polar bear and visual 12 showed water in the streets. Visual 11 was scored high by women with an average grade of 3.875. This could have been expected since women generally have more empathy, especially towards a starving sad polar bear.

Overall, visual 11 has the highest average given grade. This is interesting since it was a bad visual according to the guidelines.

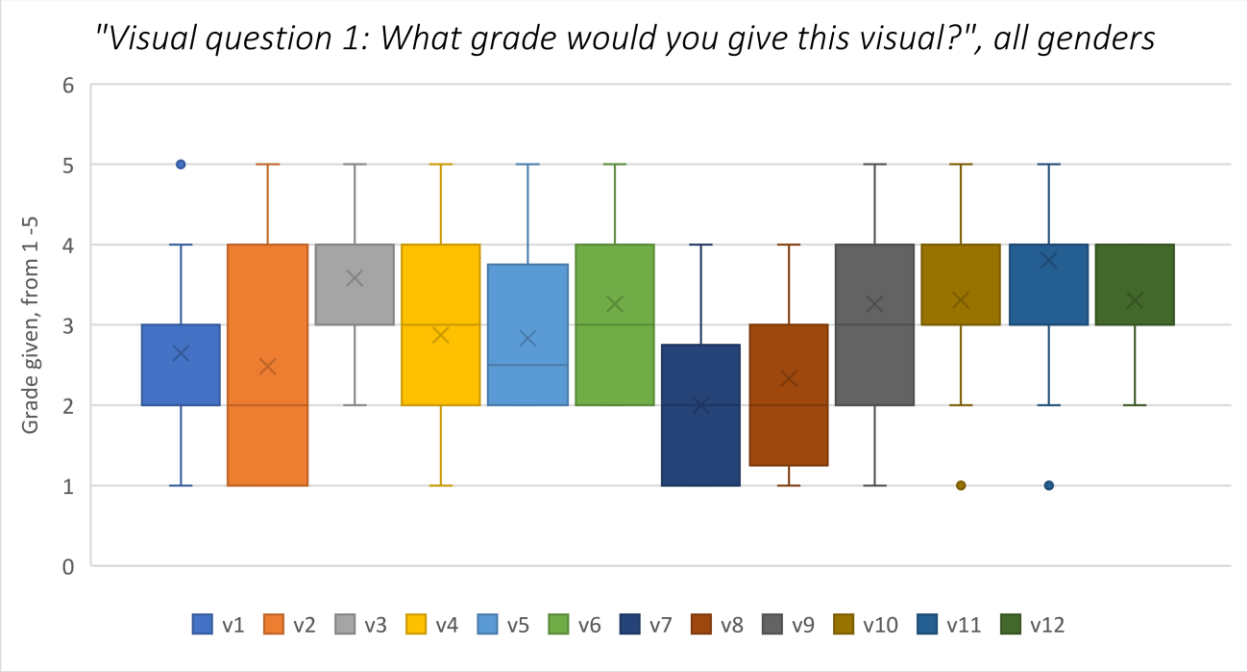

Figure 15: Boxplot of the grade given to a visual on VQ1, all genders.

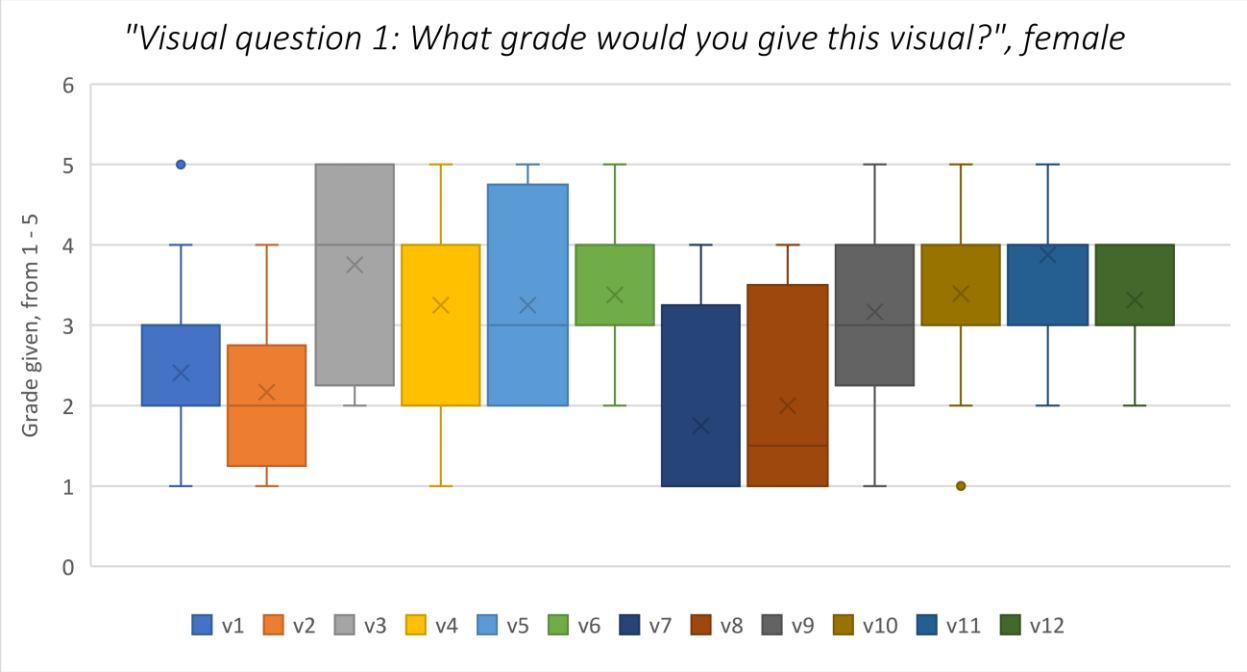

Figure 16: Boxplot of the grade given to a visual on VQ1, female.

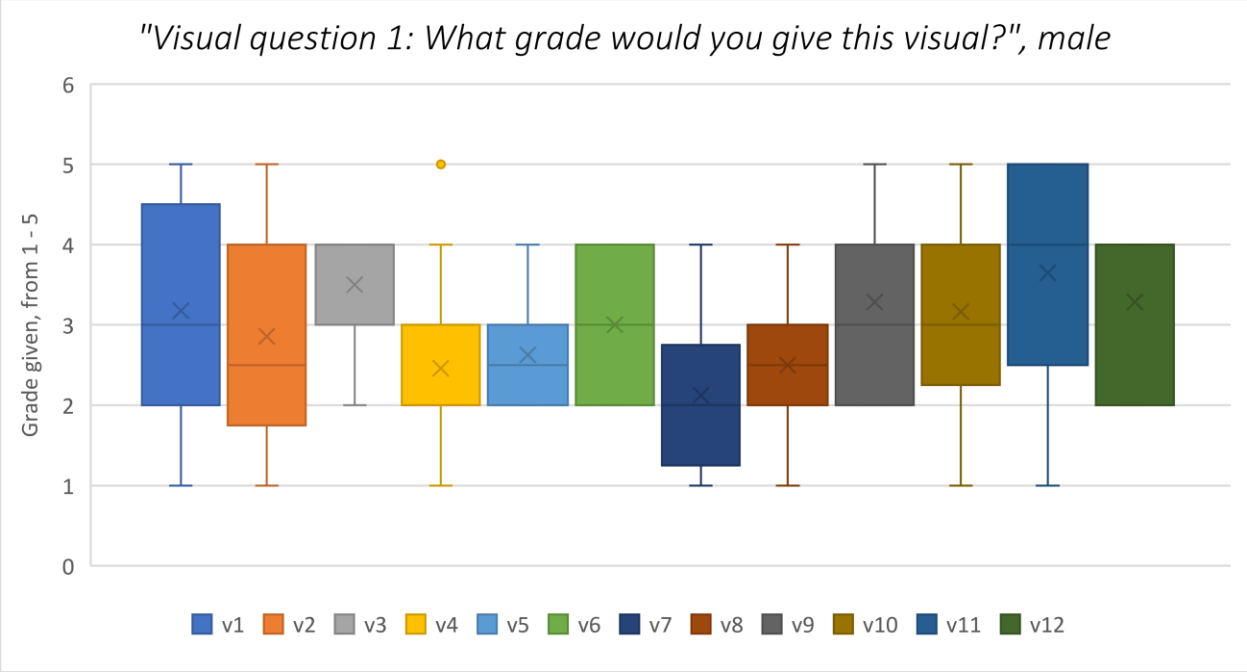

Figure 17: Boxplot of the grade given to a visual on VQ1, male.

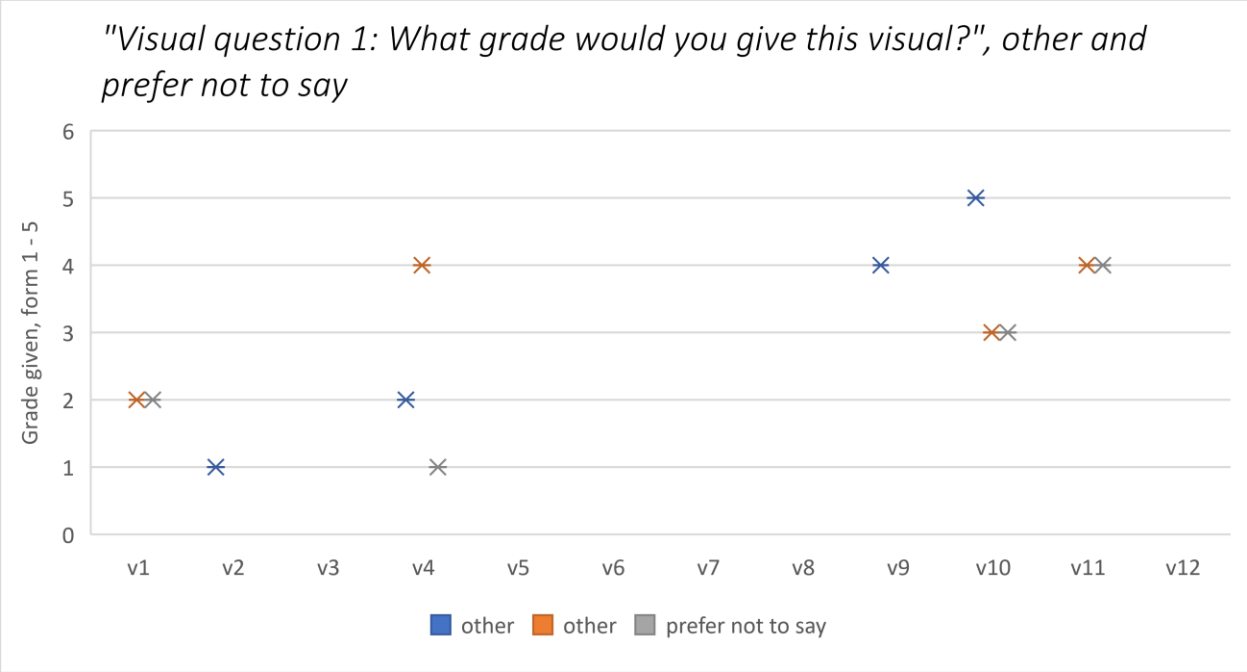

Figure 18: Boxplot of the grade given to a visual on VQ1, 'other' and 'prefer not to say'.

6.2.1.2 Visual question 2, helpfulness

When asked about their opinion of the helpfulness of a visual, the participants could give an answer on a scale from 1 till 5. Figure 19 till 22, show the results in a boxplot. Just as with the other visual, it was expected that there would be a visible difference between the good and the bad, with the good scoring generally higher. Furthermore, it was expected that the visuals that are scored highest by females, are

visuals 1 till 3. And those scored highest by male would have been visual 4 till 6.
As can be seen in figure 19, visual 3, 9, 10, 11 and 12 did relatively well, looking at all genders. These visuals are about food waste (3.3), glaciers(3.3), ice cream(3.02), the polar bear(3.6) and water in the streets(3.5), respectively. Interestingly, visual 11 is again graded highest, by women. As visual 7 is graded low. By men, visual 12 was graded highest.

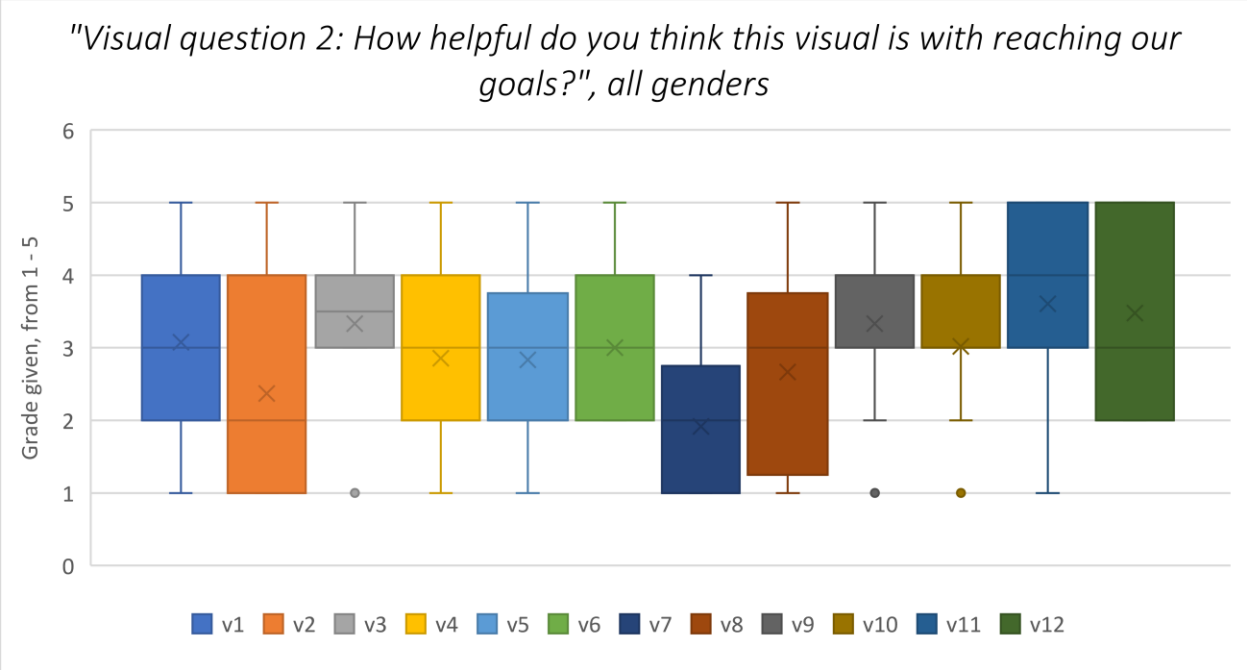

Figure 19: Boxplot of the grade given to a visual on VQ2, all genders.

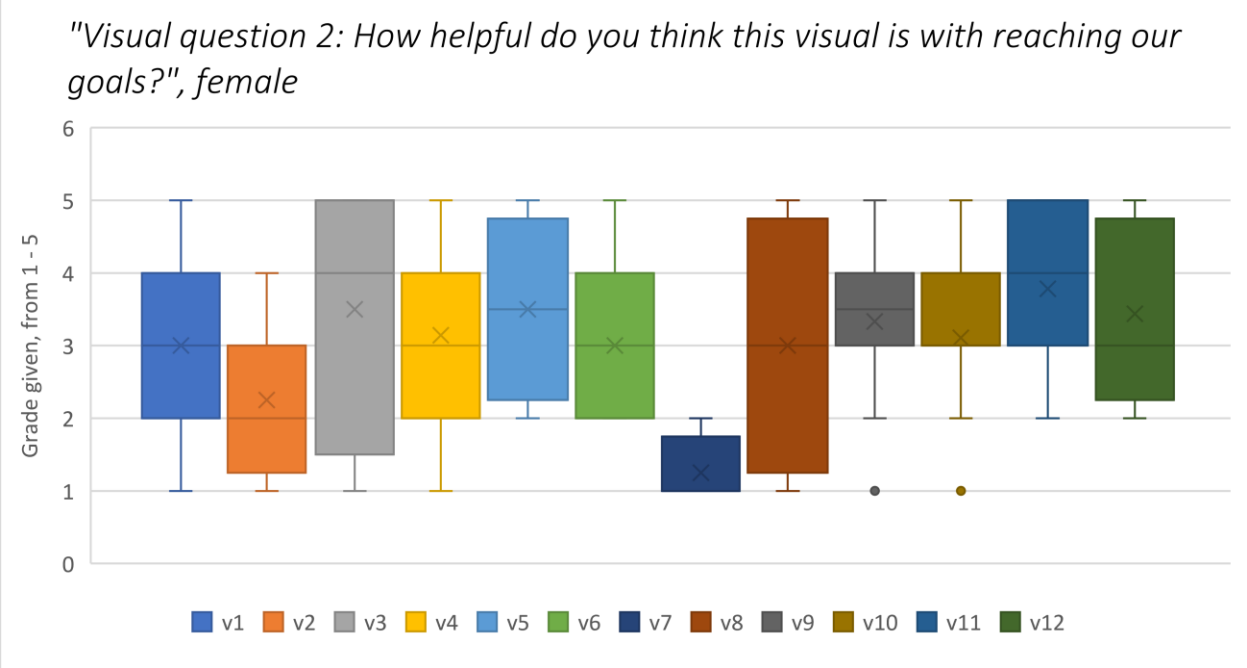

Figure 20: Boxplot of the grade given to a visual on VQ2, female.

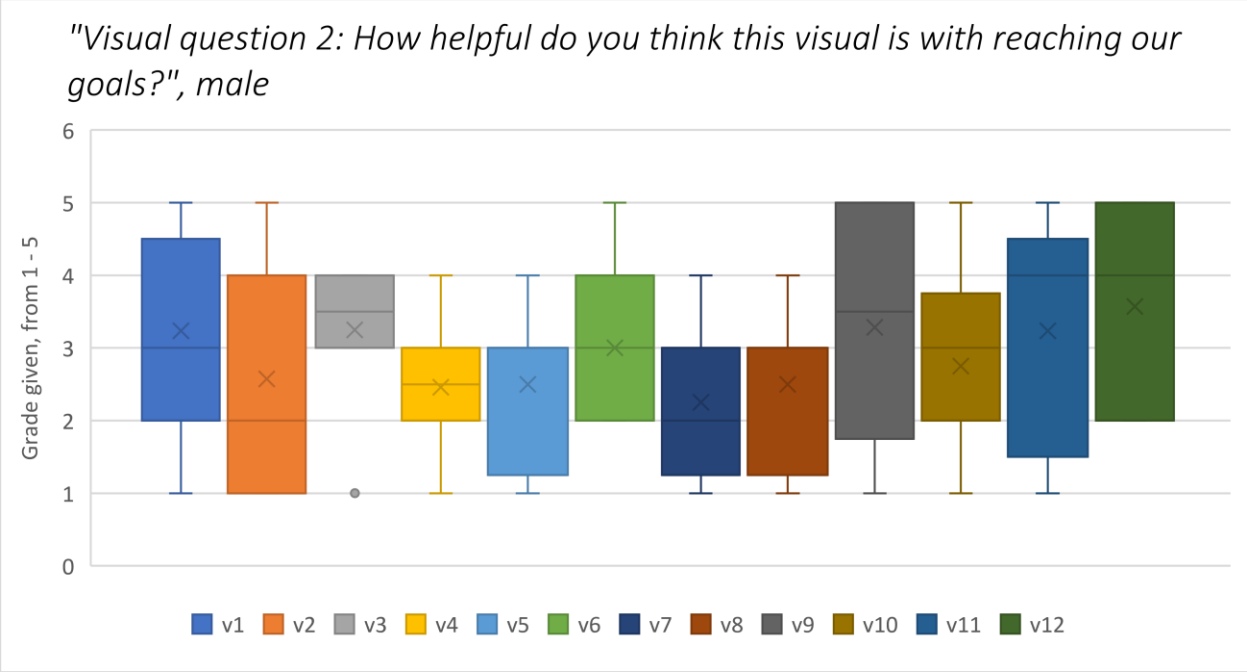

Figure 21: Boxplot of the grade given to a visual on VQ2, male.

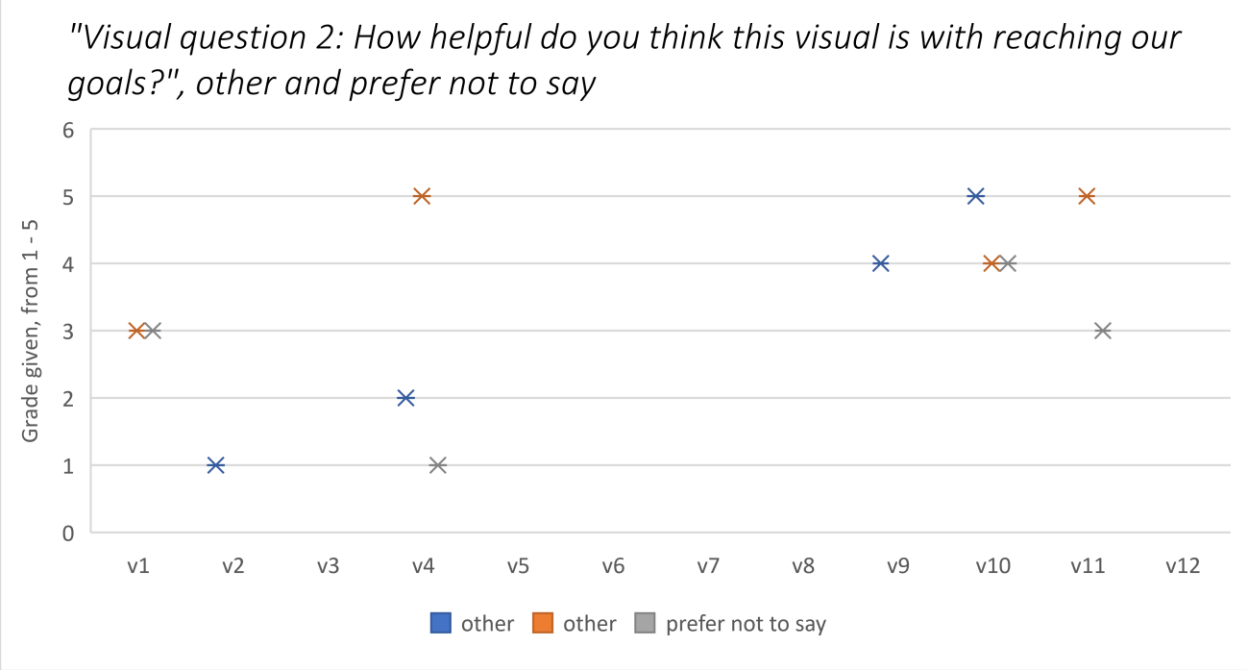

Figure 22: Boxplot of the grade given to a visual on VQ2, 'other' and 'prefer not to say'.

6.2.2 Average change in “taking action”

General question 6 (GQ6) and final question 3 (FQ3) asked people to grade how much action they felt that they were taking in an effort to reduce climate change. GQ6 was asked before showing the visuals and FQ3 asked this afterwards. The difference between the grade given before and after, is defined as the change.

The average change is then defined by the change per group, either based on the segmentation group or the 'random' chosen number group.
When looking at the difference between these numbers, the average increase over the whole sample was 0.611. This is a high number for average change, especially on a scale of 1 till 5. One analysis was done based on the climate change segmentation group, this is shown in table 6. Another was done based on the 'random number' that was chosen, this is visible in table 7.
Table 6 shows the total number of average change of females is 0.54. This is lower than the total number and also lower than the total number of average change of males, which is 0.69. However, the average change of females for segment 5 5, is 0.66. This is higher than the average change of total for the same segment 5 5, which is 0.60. It is interesting to see that the people, who already fully believe that climate change is happening and have the highest concern about climate change, in segment 5 5, can still change their opinion by seeing climate change campaign visuals.
No other conclusions can be made based on this table as the amount of people per segment is too small.

Table 6: Average change in grade given to "GQ6 & FQ3 taking action", per Climate Change segmentation group.

Labels	2 1	3 1	4 2	4 3	4 4	5 2	5 3	5 4	5 5	total
Average change of all	-2	0	0.5	0	0.75	1.5	0.8	0.74	0.60	0.61
Amount of all	1	1	2	4	4	2	10	19	47	90
Average change of female				0	1		-1	0.4	0.66	0.54
Amount of female				3	2		1	10	32	48
Average change of male	-2	0	0.5	0	0.5	1.5	0.88	1.11	0.54	0.69
Amount of male	1	1	2	1	2	2	8	9	13	39
Average change of other							2		0	1
Amount of other							1		1	2
Average change of prefer not to say									0	0
Amount of prefer not to say									1	1

Table 7 shows the same average change, but now segmented based on their 'random' chosen number. This is interesting to look at because it shows the impact the visuals had on the participants. Of course, the total number of average change of all, is again 0.61. What is interesting is that the people who chose 3, have an average change of 0.86. They were shown v2 about CO_2, v4 the bus, v9 the glaciers and v10 about ice cream. These four visuals were graded average before. But the combination of them, might have resulted in this rise of taking action.

Table 7: Average change in grade given to "GQ6 & FQ3 taking action", per 'random number' chosen.

Groups on number chosen	1	2	3	4	5	6	total
Average change of all	0.5	0.67	0.86	0.53	0.61	0.33	0.61
Amount of all	6	6	21	34	17	6	90
Average change of female		0.5	0.75	0.55	0.42	0.5	0.54
Amount of female		4	8	20	12	4	48
Average change of male	0.5	1	0.83	0.58	1	0	0.69
Amount of male	6	2	12	12	5	2	39
Average change of other			2	0			1
Amount of other			1	1			2
Average change of prefer not to say				0			0
Amount of prefer not to say				1			1

6.2.3 Standing out visuals

The second to last question people were asked, is:

What visual stood out to you the most?

The visual that stands out the most is a visual that was not immediately dismissed by the subject. Therefore, it shows more potential for lasting behavioural change. This is necessary to really convey the message. In table 8, the results of this question are visible. Some people gave multiple preferences. The visuals are at the top of the table, the 'random' number chosen is visible on the left. Per visual there are two columns, one for the absolute number of times that visual was chosen, the second number is the relative amount based on the total responses for that 'random' number group. At the bottom there are three rows, the first is the sum of the absolute numbers of that visual. The second row is the amount of people that visual was shown to. The last row is the relative number based upon the two rows above it. With light yellow, the visuals that were shown per 'random' number chosen are visible. In each of those groups, the number with the highest amount, is coloured darker.

Based on the absolute numbers visible at the bottom row, one could say that visual 11 has the most responses with 28, and therefore stood out the most. However, after normalizing the data to account for the difference in group sizes, visual 5 scores better with 2 out of 3 answering that it was the most memorable visual. However, the total amount of people that the visual was shown to is only 12, which is a small sample. Visual 11 is about the polar bear, visual 5 is about eating less meat.

Table 8: Visuals that stood out the most per 'random' chosen number, absolute and relative numbers, some respondents gave multiple preferences per person.

Total		v1		v2		v3		v4		v5		v6		v7		v8		v9		v10		v11		v12		
	1					1	0.143			4	0.571			1	0.143	1	0.143									7
	2			1	0.125					4	0.5					2	0.25	1	0.125							8
	3			2	0.091			5	0.227									6	0.273	9	0.409					22
	4	4	0.095					10	0.238											10	0.238	18	0.429			42
	5	4	0.211									2	0.105									10	0.526	3	0.158	19
	6					4	0.667					0	0	1	0.167									1	0.167	6
Absolute		8		3		5		15		8		2		2		3		7		19		28		4		
Shown		51		27		12		55		12		23		12		12		27		55		51		23		
Relative		0.16		0.11		0.42		0.27		0.67		0.09		0.17		0.25		0.26		0.35		0.55		0.17		

6.3 Qualitative answers and analysis

For this part of the evaluation, all the qualitative answers have been read and the responses are analysed. The analysis starts by comparing the answers given on the following questions:

> *Visual question 3: What elements of the visual are useful for reaching our goals?*
> *Visual question 4: What elements of the visual are not useful for reaching our goals?*

The answers are split up per visual. The answers were filtered, so that only the relevant answers were used. These answers can be seen in Appendix B. A summary of the responses per visual is given below, with a clear distinction between what each respondent thought useful or not. After all good visuals are discussed a clear overview is given, based on table 2. This is also done after the bad visuals are discussed and shown in a table based on table 3. Those tables show the used guidelines. They are expanded with the answers of the participants. In the overview, the correlation with literature and the support of participants can clearly be seen.

At the end, the following question will be analysed:

> *Final question 1: After seeing these visuals, would you say that your opinion on climate change has changed, and why?*

6.3.1 The good

6.3.1.1 Visual 1: The 1.5°C vs. 2°C temperature rise

The elements that were found to be useful, according to the respondents, are the informative part and the consequences along with it. The participants thought that the information was clear, easy to understand and it could help create awareness. The small amount of info and the use of numbers was good. Showing the consequences and impact of the difference in temperature was found to be useful. "It is convincing and confrontational." One person even liked that it scared the viewer a bit. It clearly shows why the goal of reducing climate change is important. About the graphical elements of the visual was said that the symbols and colours were helpful, and that the simple looks made it clear.

The major element that was criticised is that it takes a long time to read it and understand it due to the confusingly huge amount of information, how cluttered and messy it is. People have a "limited attention span" and this visual does not catch people's attention. Furthermore, the consequences were unknown as the numbers did not have a real meaning to them, examples or pictures would have been better. The participants also did not know what to do with this information and wanted a "follow up" that shows what action they can take.

6.3.1.2 Visual 2: The CO_2 levels over time and the scientific consensus

For visual 2, the elements that were mostly useful have to do with the information. The participants thought it to be informative, the scientific evidence was helpful, and the data visualizations made it better to understand. It was appreciated that the information was put into a "temporal context of the industrial revolution", showing the impact of CO_2. Someone said that it scared them a bit, which they thought was helpful.

Interestingly, there were also people who did not think that the graphs are useful. This is because graphs are unclear since there is too much information which is difficult to understand. Someone said that the

information was about two unrelated facts. There is a need for a source. It does not grab peoples' attention. Again, multiple people expressed a need for a follow up of what to do against climate change. What is most interesting is that there were three people who stated that this visual could create polarization and scepticism.

6.3.1.3 Visual 3: The food wasted by Dutch people

The slogan "cook it, store it, share it" and the overall message were found to be useful. The source at the bottom was indicated as good. The numbers that were used are nice and the picture helped with giving inside.

For visual 3, the participants suggested to make it clearer what the 34 kg, mentioned in the text, actually comes down to. Someone suggested to give an indication of how many days one can eat from that. Unexpectedly, three people found that either the image was unclear, did not seem to represent the 34 kg or saw no correlation at all. Someone saw no direct link to climate change. The source text was found to be too distracting.

6.3.1.4 Visual 4: The bus

There were many positive reactions on visual 4. People liked the concept of the information on the side of the bus, actually being about the bus itself. The fact that the bus drives around may provide an opportunity that people will not get tired of seeing the same things over and over. But at the same time, many people get to see it. The information was factual with numbers and raising awareness, this was found to be useful and initiated a reflection process on the topic. It makes someone think. The message on the side of the bus with a clear action was nice, it gives a "personal involvement" and motivates. It shows the effect a choice has, that even small things make a difference. The use of everyday examples sets the bar low to participate. One participant thought it is useful that the message is not pushing to do something. However, someone else found that it made them feel guilty. The white text on a black background is attention grabbing.

The biggest critique was that there is too much text to read, especially since the bus is moving. Most people that will see the visual, are already using public transport. According to some participants the text is not impactful enough as small things will not change the overarching problem. There was also someone who did not like the guilt trip. One interesting response is that black and white could suggest a taboo, which climate change should not be. Furthermore, the visual is not eye catching or visually pleasing, and a suggestion was to make use of images.

6.3.1.5 Visual 5: Eat less meat

Visual 5 received a lot of positive reaction as well. The quote "No one can do everything. Everyone can do something." was appreciated by many and found to be helpful. It shows that imperfection is fine, just take small steps and try. The message is clear, to the point and not aggressive. This makes it a captivating text. The use of green and white, the simplicity and the big letters make it aesthetically pleasing.

Many people wanted the quote to be more readable as they found it was the highlight of the visual. In the current visual, there is less contrast between the letters and the background, and the font size is small. The use of capital letters at the beginning of each word was questioned, and the symbol of the plant was distracting. One respondent would like to know more about the actual benefits of going meatless.

6.3.1.6 Visual 6: Reduce, reuse, recycle

One element that was found to be useful in visual 6 is the message of what to do. It clearly describes the actions someone can take. The visual could act as a cue and reminder for the message. The use of the colour green and the image brings a connection to nature.

However, the quote was found to not be catchy, will be forgotten and have no impact. The logo was confusing to one, and the green gradient tacky. A more minimal design was suggested to be more effective. Some respondents wanted an explanation what is actually going wrong and a reason as to why they have to reduce, reuse, and recycle. It could be too much effort to do good.

6.3.1.7 Conclusion

After analysing all answers and feedback that was given to each visual, table 9 was made. This table makes use of table 2 as a basis. The guidelines that were used and established beforehand as (V), can be seen in the table. The elements that were found to be useful are indicated by (+) and those that were found to not be useful or missing are indicated by (-). In the table, the correlation between the established guidelines and their support by respondents can be seen. Some guidelines were not mentioned by the participants, even though they are guidelines important for a good visual.

Table 9: Guidelines of elements per good visual (V), elements that were found to be useful (+) and elements that were not (-).

Visual: F=female, H=hybrid, M=men:	1 F	2 F	3 H	4 H	5 M	6 M
Clear message	-	-	V +	+	V +	V -
Easy to understand	-	-	V		V +	V
Pictures for showing impact on world	-		V + -			
Grabbing attention	V -	-	V	V + -	V	V
Minimized text		V	V	-	V	V
Information for raising awareness	V +	V + -	V + -	V +	-	-
Make use of numeric statements, graphs	V + -	V + -	V +	V +		
Humour						
Raising engagement	+		V	V +	V	V
Remove perceptual barriers			V	V + -	V +	V
New behaviours, what action to take	-	-	V +	V +	V +	V +
Behaviour Change, social marketing theory, multiple motives, spill over effect			V -	V	V	V
Do not use fear → uses fear	V +	V +	V	V	V	V
Sources should have credibility		-	V + -			
Feedback and familiarity						V
Emotions						
Make it local	V			V		
Individual or group targeting				V + -		
Aesthetics, colours, fonts,	V +			V + -	V + -	V + -

Consequences, impact	+ -			+		
Confrontational	+					
Convincing	+				+	
What is coral bleaching	-					
Temporal context		+				
Scientific evidence		+				
Increases polarized opinion		-				
Guilt trip				+ -		
No pushing, demanding				+	+	

Most support was given for the guidelines 'information for raising awareness' and 'new behaviours, what action to take'. The visuals that contained these elements, got support for it. Those visuals that did not have the guidelines were commented on for missing them. This suggest that there is a need for both information and a suggestion for action, and not as expected either one of them. Furthermore, the use of numbers and graphs was suggested as useful. As well as a clear message that is easy to understand and makes use of images. Visuals need to be attention grabbing and aesthetically pleasing. Removing the perceptual barriers by suggesting small steps that seem doable. The source and its credibility were suggested. Some elements that were not specifically found in literature but were indicated to be good or necessary are the insight into the impact humans on climate change or the impact of climate change on humans, that the text is not demanding or anything but merely suggesting. Some small contradictions in the responses were noticed but in general people agreed with each other.

6.3.2 The bad

6.3.2.1 Visual 7: The Swedish bananas

According to participants, the only good part of visual 7 was the humour that was used. It is different than all the other visuals that are used often. Humour makes the viewer think more about the topic which helps to raise awareness.

The visual was found to be too complex. It is not really clear of what the joke actually implies and what the real effects are. Humour also does not work on everyone. The text at the bottom is too demanding and does not state what action to take in an effort to reduce climate change, only that something should be done. The sticker on the banana should be bigger so that the text and joke are better readable.

6.3.2.2 Visual 8: The forest fires

Visual 8 only has a few responses, but they all say that it has an image which portrays the problem well. It is shocking, creates guilt and shows trauma, which people thought was useful.

However, someone also says that shock could create the opposite reaction. While someone else suggests using the image of a burned animal. It is too demanding and the action to take is not clear. The font was considered to look unprofessional. There is no clear link between the forest fire and climate change.

6.3.2.3 Visual 9: The melting glaciers

The mayor element that was found to be useful, is the comparison in images taken over time. It shows a drastic change and a clear impact of climate change. For some it is relatable, which makes people motivated. It is an eye opener and a reminder that "beautiful nature" is disappearing.

Of course, for some the images are not relatable. There is no direct effect on someone's life, which could result in that people do not care about it. Some respondents were sceptical about the legitimacy. There is a clear message of what can be done to prevent it from happening. The font is said to be bland and not conveying the urgency of the matter.

6.3.2.4 Visual 10: The ice cream

Visual 10 was relatable for many participants since they love ice cream. It is recognizable and gives a personal incentive. The use of humour was liked. The image of the empty ice cream cone and the big text "we're sorry" grabs the attention. Someone found it nice that it is confrontational. Overall, the visual is something new, simple, bold, and effective.

Nevertheless, many participants did not like it. It is too playful and does not take climate change seriously. It "downplays the severity" of the situation and it is not engaging. Ice cream is something trivial and a luxury product. People wanted more info and saw no connection to climate change. The participants found the text incorrect and misleading. The manipulation was not found to be useful. It also did not give a clear explanation of what action can be taken in order to avert this.

6.3.2.5 Visual 11: The polar bear

The polar bear in visual 11 was upsetting to some. It gives a view on the situation; it creates an emotional response like empathy or makes people feel uncomfortable. This could all help to make the message stick. It clearly shows the impact and the urgency of the situation. The big slogan is useful.

This emotional response can also have adverse reactions. It is shocking, scares and makes people feel guilty. The problem is too big, some might even become hostile against the situation. The situation is far away from home that people can ignore it, "there are no consequences for us". There are many sad animals, it does not make people motivated to take action. On top of that, it is also not clear what action people can take. The image is used too frequently and not effective anymore. The implication that the bear is skinny because of climate change is unclear.

6.3.2.6 Visual 12: The water in the streets

The images in visual 12 is effective. It shows the consequence and is relatable. It shows a direct problem that can affect someone. Someone said it was a reminder of climate change. Surprisingly, the fear appeal and confronting nature were said to be useful.

Contradicting feedback was also present, stating that the information was not relatable at all. It was not making them more aware of climate change. They were denying that it would happen and questioned whether it was actually correct. The use of "could" sounds unsure. Overall, the visual was found to be unprofessional, the yellow text and the fact that the actual problem was easily overlooked as the image falls into the background. It does not clearly state what action can be taken in order to prevent the situation.

6.3.2.7 Conclusion

After the analysis of the answers and feedback that was given to each visual, table 10 was made. The guidelines that were used and established beforehand are indicated as (X). The elements that were found to be useful are indicated by (+) and those that were found to not be useful or missing are indicated by (-). In the table, the correlation between the established guidelines and their support by respondents can be seen. Some guidelines were not mentioned by the participants.

Table 10: guidelines of elements per bad visual (X), elements that were found to be useful (+) and elements that were not (-)

Visuals	7	8	9	10	11	12
Clear message		X		+	+	-
Easy to understand → not easy	X -			X		
Pictures for showing impact on world		X +	X +	+	X +	X -
Grabbing attention	X			+		
Minimized text	X	X		+	X	X
Information for raising awareness	+		X +	-		+
Make use of numeric statements, graphs						
Humour	X + -			X +		
Raising engagement						
Remove perceptual barriers						
New behaviours → no clear action	X -	X -	X -	X -	X -	X -
Behaviour Change, social marketing theory, multiple motives, spill over effect						
Do not use fear → fear		X -			X -	X +
Sources should have credibility → no source			X -	X		-
Feedback and familiarity					X -	
Emotions					+	
Make it local → distant in time, space, species		X	X -		X	X
Group targeting → relatable to many			X + -	+	-	X -
Aesthetics → not aesthetically pleasing	-	X -	X -			X -
Unique visual	+			+	-	
Demanding	-	-				
Guilt		+				
Connection with climate change unclear		-			-	
Increases polarized opinion, scepticism			-			
Trivial topic			-	-		
Confrontational, impact				+	+	+
Downplays severity				-		
Misleading, manipulation				-		

As mentioned before, there is a need for information about the topic and a clear suggestion what action can be taken to reduce climate change. A new suggestion is that humour can be nice but the visual should be true and caution should be taken not to downplay the severity of the topic. The unique quality of v7, about bananas, and v10, about ice cream shortage, was appreciated. The visual of the ice bear is very common and not impactful anymore. Some things were distant or trivial hobbies, these are bad elements. The use of fear was not beneficial, which is in line with contemporary research on the topic.

6.3.3 Final questions

At the end of the survey, the participants are asked whether they think their opinion had changed. This is a small list of the six people with answers that their opinion changed slightly:

- "Yes, sometimes I just need the reminder that it's real and we really need to do something. Because there is so much going on in the world right now, people forget that stuff like this is really happening."
- "I don't think it changed, I just felt reminded of how urgent and impactful this issue is."
- "I have always been aware of the situation regarding climate change but with these visual aspects my concern has increased."
- "I was aware of the consequences of climate change and had seen similar poster. So, my opinion hasn't changed much."
- "A little bit, I knew already everything, but it got my attention again and will be thinking about possible changes."
- "I was shocked a bit when I say the glacier 2003-2008. But otherwise not really changed."

Out of the 90 responses, only six people stated that their opinion either changed or they were reminded about climate change again. This made them feel like they should take more action. This is interesting as the average difference in grade in effort to reduce climate change, is high. As can be read about in chapter 6.2.2.

Chapter 7 – Conclusion

After a research period of 5.5 months including a theoretical analysis, a survey period, and the analysis, it is time to look back and answer the research question. The research question, from the start of this research is:

> *What are the guidelines that campaign makers should consider when making a successful campaign visual?*

A complete list of the guidelines can be seen in table 11. In the literature column, it is shown what the sources said that were investigated in chapter 2. The qualitative responses on the survey are visible as well. It is clearly visible what guidelines are supported by just literature, what guidelines are supported by both, and some extra guidelines that were suggested by the respondents.

Table 11: Final list of the guidelines

Guidelines	Literature	Survey responses
Clear message	V	V
Easy to understand	V	V
Pictures for showing impact on world	V	V
Grabbing attention	V	V
Minimized text	V	
Information for raising awareness	V	V
What is coral bleaching		V
Temporal context		V
Make use of numeric statements, graphs	V	V
Humour	X	X
Downplay severity		X
Misleading, manipulation		X
Increase polarized opinion, scepticism		X
Raising engagement	V	
Consequences, impact		V
Confrontational		V
Convincing		V
Guilt trip		X
No pushing, not demanding		V
Remove perceptual barriers	V	V
New behaviours, what action to take	V	V
Behaviour Change, social marketing theory, multiple motives, spill over effect	V	V
Connection with climate change unclear		X
Fear	X	X
Sources should have credibility	V	V
Scientific evidence		V
Feedback and familiarity	V	
Unique visual		V
Emotions	V	V

Make it local	V	V
Trivial topic		X
Individual or group targeting	V	
Aesthetics, colours, fonts,	V	V

The numerical answers on the survey were inconclusive. There is not one visual or group of visuals, that performed significantly better than the others. Even the visuals that were created to be bad, still received some high unexpected grades.

Visual 11, about the polar bear, was graded highest on average, both on the question about whether participants like the visual and whether they thought it was helpful. This is interesting as literature showed that people are not engaged by this visual anymore. The visual makes use of fear, something distant that people cannot relate to, and does not inform or engage people in what action they can take in an effort to reduce climate change.

On the question of what stood out to them the most, respondents answered visual 5. This visual is about eating less meat. The reasons why this might be the best visual, is that it suggests an action to take, it is not clearly related to climate change, and it removes perceptual barriers by suggesting to take small steps, which is already good.

Chapter 8 – Discussion and Future Work

This chapter will be about aspects that could have gone better, and how this could be done. It will end with suggestions for future research.

8.1 Discussion

The most important part to discuss is the bias of the researcher. This whole report is made by one person. The literature research, the making of visuals based on the determined guidelines, the survey and afterwards the analysis and conclusion of the survey, all done by the author. The demographics of the author are female, within the target group, fully believing in climate change and concerned. This will influence how the importance of this research is viewed and how the answers from the participants are analysed. This could be improved by having multiple people working on the research and check the conclusions found afterwards.

Furthermore, the survey could be improved. First of all, the tool used to make the survey does not have a random assignment function. To mimic this functionality the participants were asked to choose a random number from 1 to 6. However, the distribution of the chosen numbers was not uniform, this resulted in large variations in group size. Consequently, certain visuals have less responses than others. This led to minor difficulties in interpreting the responses to certain visuals. The use of a tool that can automatically create the groups randomly, would help solve this problem.
Secondly, some questions were asked in an ambiguous way that led to multiple interpretations. Which resulted in questions being answered in ways which did not match with the way the questions were intended. A question with a minor ambiguity, is the question: "*What year were you born?".* Almost all the answers were in the right format, but two answers were not. One being "Germany", the other being "India". This could have been prevented by giving them a list of options instead of an open answer.
The next question which was ambiguous is: "*What is your highest level of education?".* It should have been made clearer that the question was to note their highest achieved degree, or the degree they are currently working towards. Because of this, the representational quality of this sample cannot be verified.
Another bias and issue with the survey is the type people that participated in the survey. The survey was sent out to approximately 50 friends, fellow student, housemates, and relatives of the researcher. It could be argued that these people have roughly the same kind of beliefs, age and level of education as the researcher. However, those 50 people were asked to forward the survey. So, the other 47 respondents are friends from friends, which makes the sample more diverse. It is also known that one friend forwarded the survey to his study mates, which currently have courses about visuals and their argumentative effects on people. This could have had resulted in the answers with high quality as these participants know about certain guidelines for good visuals.

8.2 Future work

Some suggestions can be made after this research. First of all, a more thorough investigation should be done on targeting the segmentation groups and then specifically the Disengaged, the Cautious and the Concerned. This research did not have enough respondents within those groups to do an analysis based on that. Future research should target those that fit into either one of the groups.
This research focused on a specific target group. Other research should focus on other target groups, to make a more complete targeting of the population. This research was focused on young people aged 18 till 30. But what about the even younger children, and their parents.

Furthermore, with the guidelines mentioned and recommend by the survey respondents, more literature research can now be now based on these guidelines.
Other future research could focus more on the graphical aspects of a campaign visual. Investigating the use of colours, different fonts, images, and other graphical elements. Researching the impact, it can have on how a visual is received.

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Appendix A.1 Information brochure

Enschede, January 2021

Information brochure Department Pervasive Systems

Dear reader,
In this letter, we would like to inform you about the online survey you will soon participate in. You can fill in the survey any time you want and take as much time as needed. You can decide to stop at any point in the course of the experiment without this having any consequences for yourself and without giving any reasons. In addition, you can still decide at the end of the research and up to 24 hours thereafter, that your data may not be included in the research after all.

In the proposed research, entitled "Guidelines from Climate Change Communication Visualization", your awareness of climate change is tested at the beginning of the survey. After this your opinion about given visualizations is asked. The visualizations will be shown, and questions will be asked afterwards. The visuals that will be shown, are visuals for climate change campaigns and their effectiveness will be tested. If you do not know much about climate change, some visuals could contain shocking information that could cause negative emotions. This is not the intention of the research, but some people could experience these emotions.

The research could provide certain insights into how climate change visualizations are perceived, what works and what does not work. On this, conclusions can be based that can help in forming guidelines for policy makers for making successful campaigns.

Other relevant aspect is your data. The only personal data that will be collected, is your age and gender. Your data will be handled in a confidential manner, the anonymity of your data is guaranteed and will never be disclosed to third parties without your permission. At the end of the entire research, you may, if you so wish, be informed about the results obtained by means of a debriefing.

The survey will take approximately 10 minutes.

Yours sincerely,
Charlotte van Doorn

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Appendix A.2 Consent form

Consent Form Guidelines for Climate Change Communication Visualization

'I hereby declare that I have been informed in a manner which is clear to me about the nature and method of the research as described in the information brochure. My questions have been answered to my satisfaction. I agree of my own free will to participate in this research. I reserve the right to withdraw this consent without the need to give any reason and I am aware that I may withdraw from the experiment at any time. If my research results are to be used in scientific publications or made public in any other manner, then they will be made completely anonymous. The only data that will be stored is personal data, about my gender and age, and my answers to the survey. My personal data will not be disclosed to third parties without my express permission. If I request further information about the research, now or in the future, I may contact Charlotte van Doorn, c.h.m.vandoorn@student.utwente.nl.'

If you have any complaints about this research, please direct them to Drs. P. de Willigen, the secretary of the Ethics Committee of the Faculty of Electrical Engineering, Mathematics and Computer Science at the University of Twente, +3153 4892085, P.O. Box 217, 7500 AE Enschede (NL), email: ethics-comm-eemcs@utwente.nl.

Signed in duplicate:
…… ……
Name subject Signature

I have provided explanatory notes about the research. I declare myself willing to answer to the best of my ability. any questions which may still arise about the research.'
…… ……
Name researcher Signature

Appendix B Qualitative answers and analysis

B.1 The good

B.1.1 Visual 1: The 1.5°C vs. 2°C temperature rise

Table 12: Visual 1, the useful answers to VQ3 & VQ4

What elements of the visual are useful for reaching our goals?		What elements of the visual are not useful for reaching our goals?
The content is very good, it is a direct comparison between two future scenarios that we can determine the outcome of		Poor visualization. It takes some time to understand and does not catch people's attention.
it's colour-coded,		you can not see in 1 second what is meant by the poster.
the viewer is told some heavy consequences like heatwaves and rising sealevels.		not really giving a clear starting and ending point.
The impact is clear, difference of .5 degrees is great		There are too many elements, so you most likely wont read it
I think it's good to show the real impact of "just 1,5 degrees"		Too much text, unclear how to interpret the information
It is very informative and the numbers are extremely convincing.		I don't know what coral bleaching is. It only gives a small amount of information of each topic which means it doesn't have an effect on me. 40 cm water rise doesn't sound bad because I do not know the consequence of that.
It shows the possible effects of climate change and in contrast the effect if we try to limit it. It's pretty confrontational which might help people with realizing that their actions and participation really makes a difference.		The image is not very catchy or attention drawing
it "scares" (=showing severity/need) the targets into thinking if they should do something		No follow up l, what can I do after reading this? Would be useful alongside a pitch!
I liked that the information was displayed in a creative, yet simple, manner.		I found it a bit confusing at first, especially on how to read and interpret the information in a way that it made sense for the argument of "let's limit the temperature rise to 1,5Â°C".
Informative, which is nice!		Numbers do not really impact people. Examples do.
It gives actual information, not just saying we need to do something about climate change but it tells why we need to do something about climate change		What does that mean how will this impact my life. Besides how do I keep it from happening?there are no examples of what you can do.
The very clear presentation and use of numbers and statistics.		Pictures will be better than symbols i think
You give a lot of information and people want that. There is a strong WHY and WHAT here.		If you want to have an effective poster, you need to simplify it. (Replace words/numbers by

It is limited to a few subjects wich makes it easier to understand. The numbers are clear The colors make it easier to seperate the good from the bad	pictures for instance) People have a timespan of 1/2 sec online (maybe even in real life) before they scroll or look away. You mis the HOW
seeing the consequences	It's not clear what message the poster wants to convert.
General info of the visual and small amount of info in it, also small symbols is a good idea.	i wonder who would a actually take the effort to read. I didn't personally know about the 2 degree effects and i'm thinking it would help create awareness on those effects for people like me (who care about climate change but aren't experts in this) but for others i'm not sure.
It gives a goal	too cluttered/confusing
The colours help	the graphic design is bad, too messy i don't know where to look.
Lots of information.	

B.1.2 Visual 2: The CO_2 levels over time and the scientific consensus

Table 13: Visual 2, the useful answers to VQ3 & VQ4

What elements of the visual are useful for reaching our goals?	What elements of the visual are not useful for reaching our goals?
real facts	People do not like reading graphs
It is factual and leaves no room for interpretation	No explanation of what is to be done about this. Perhaps a bit too technical a graph for a general audience.
Puts our crisis in a temporal context, that there is a serious issue that has only begun with the technological/industrial revolutions.	once again, they don't offer or suggest a call to action,
It provides some scientific evidence potentially squashing some doubt.	It combines 2 unrelated facts, focus on 1
fearmongering effect	Way too many information, people arenâ€™t concentrated enough to look at it
Showing the CO2 increase over the last few years isn't 'normal'	if I saw this on the street, I would just walk past as it takes actual thinking to understand this.
Visual of the humans makes the 97% better to understand	Does not really state what exactly causes climate change (how humans are producing so much),
Statistics are a good way to provide context for something, and people can grasp it this way.	This is too dense in information to reach anyone who isn't already interested in the cause, it will unfortunately alienate the audience who needs to see it most.
I like charts but not everyone does	Provide a source-based element that supports your claims
	Information overload
	This only increase the polarized opinion of the subject

De lezer moet te veel zelf de boodschap er uit halen.
Although it shows that there is a responsibility it again gives no tips in itself what to and could perhaps be a tad bit more visually engaging.
The graph and difficult words and concepts
It looks too "hard" to read at first glance, like it takes effort to read and then you tend to not try to
This only awakens a discussion between non-believer.
The graph with respect to the ice ages is something towards which I am sceptical, so that does not convince me

B.1.3 Visual 3: The food wasted by Dutch people

Table 14: Visual 3, the useful answers to VQ3 & VQ4

What elements of the visual are useful for reaching our goals?	What elements of the visual are not useful for reaching our goals?
Naming the numbers	Maybe use a clear comparison how much 34 kg really is. Also a picture of the food (probably the 34 kg) doesn't directly link to climate change for me
Image; message	Providing information as to how many days this could feed someone, for example, could become beneficial to relate it to the viewer.
It informs me about something I was unaware of and gives a credible source. I like the slogan and I think it can be useful in a country where people tend to be individuals.	It is unclear whether the foodpile on the right is representative of the food that is wasted. This makes me question the professionality and thus credibility of the author.
It tell you what to do, that is good. The picture gives a good indication of what the amount of waste translates to.	It feels like a random picture next to some words, there is no correlation between them.
Cook it, store it, share it	It would be better if there are food collection centers that can be attached to the image as QR code or similar
the number	The source could be more discrete as right now it looks a bit distracting.
It demonstrates how much food people actually end up wasting in an understandable manner.	

B.1.4 Visual 4: The bus

Table 15: Visual 4, the useful answers to VQ3 & VQ4

What elements of the visual are useful for reaching our goals?	What elements of the visual are not useful for reaching our goals?
It gives a scale of the effect a choice in the daily life can make	Doing small changes wont solve the problem.
Itâ€™s a moving visual; it is not something you see always on the same place so you will not get used to seeing it on the same place.	It does not look eye-catching enough to appeal to the average person.
giving a concrete number actualizes the idea behind it.	Too much text
Very direct and clear	It is too long to read if a bus is just passing by
the clear, factual message	Too much text
Its presence in public spaces	It takes a guilt-trip approach, which could set people off...
Its performative: it underlines the viewers personal involvement and asks them to do something.	Most people who see the visual are already using public transport
Encourages the viewer through direct action to take public transportation, through awareness of facts, while also presenting the solution.	The visual is moving so people can't read it easily when it's passing by.
it's good to give people everyday examples of things that can help.	Color of the bus may attract more attention than the phrase itself
It's great for spreading awareness about climate change and informing people that small things can make a difference.	Maybe add some visualization that stands out so people are more likely to see it.
"get on board" "do not wait"	The text (probably) will not be as impactful and life-changing that people stop using their cars.
The text is making you aware	a lot of text to read quickly
make person feel guilty	It is not really visually pleasing.
Numeric motivation	add some visualization that stands out so people are more likely to see it.
You remind people of simple things like driving a car, and that those things could be damaging to the earth, without pushing people. I think people need to change themselves and this could help with that.	This black and white, plain option of displaying the message gives me an impression of a harsh topic, almost a taboo, which I believe is the opposite attitude we should have towards climate change. I think we should treat the topic as naturally as possible, in order to create more discussion spaces and better raise awareness.
Mainly the objective message about impact of the initiative.	The visual does not use any visuals like pictures, colours, etc to get the attention from the public
Facts	
The bus drives around town so a lot of people will see it	
gives factual data to convince people	

For attention, the white on black background works to grab attention
it makes you think about your current choices.
Compeling images are better than pure statments
it does a good job of making people aware of the fact that taking public transport is better for the environment.
knowing this info I am more motivated to take the public transport
So it's easier to actually take action, because the bar is so low.

B.1.5 Visual 5: Eat less meat

Table 16: Visual 5, the useful answers to VQ3 & VQ4

What elements of the visual are useful for reaching our goals?	What elements of the visual are not useful for reaching our goals?
It's aesthetically pleasing and to-the-point	Make the lower part more readable
Focus on smaller steps and not being aggressive	''Eat Less Meat'' has a capital letter for each word which I find weird and less readable.
Het is belangrijk om te laten weten dat 1 dag minder vleeseten al kan helpen en dat je het niet perfect hoeft te doen. Imperfect is ook goed, maar dan probeer je het tenminste.	It does not really explain what the benefits of going meatless are.
The simpleness, the green, and the big letters which one can read very easily	Ik zou de ondertitel en de titel omwisselen, Nu ziet de lezer gelijk de titel met minder vlees eten en dan kan een lezer denken uh ja dat bepaal ik zelf wel.
No one can do everything, everyone can do something	The plant icon has a strong contrast and pulls your eyes towards it. Personally I find it to draw too much attention away from the message it is meant to sent. The motto which I find to be the highlight is too difficult to read.
Text is true and captivating	
The text sounds well thought out and is catchy	
The "No one can do everything. Everyone can do something" is a good motto to get people involved into taking baby steps towards better action	

B.1.6 Visual 6: Reduce, reuse, recycle

Table 17: Visual 6, the useful answers to VQ3 & VQ4

What elements of the visual are useful for reaching our goals?	What elements of the visual are not useful for reaching our goals?
The left part is simple and i think it could easily turn into a visual cue for people to remind them to act green.	does not say anything about what is going wrong
The specific actionpoints given on the right.	The logo
The color and slogan	I think people already know this. It doesn't motivate me
I think the image brings forward the connection between nature and the waste of packaging etc	People are stubborn and will start neglecting these kind of visuals if the contribution to a better world cost to much effort
The phrases next to the main image	it doesn't include any reasons why
Thinking green is a good way to start, but it doesn't leave a big impact so I will probably forget it again in a minute.	a more minimal design would be more attractive
The 'instructions' are stated right next to the logo so its easy to see what you want to achive.	The element of the leaf confused me at first because it took me a while to figure out it was drawn into the symbol of recycling
	the green gradient can make it look tacky and outdated. Many people are aware of climate change and recycling, so the text doesn't add anything
	an easier pronouncable slogan might be catchy and faster to catch (for example along a highway)
	There is also no: why. People have to know why they have to do that.

B.2 The bad

B.2.1 Visual 7: The Swedish bananas

Table 18: Visual 7, the useful answers to VQ3 & VQ4

What elements of the visual are useful for reaching our goals?	What elements of the visual are not useful for reaching our goals?
Humorous, eye catching.	just because something comes from a different country doesn't necessarily mean that the climate effects are worse than that of another place
The idea is good, it help to raise awareness by making a ''joke''	Message is too complex too understand within the first impression, needs to be a little bit simpler
Humour works on a basis of unexpectedness. This may feel like a joke, but the joke part is	As someone reading this in the Netherlands, a lot of the things we often hear is to buy locally, or as

exactly what draws the attention and makes you think about the climate banana's should be grown in in order to understand the joke. Also it doesn't feel like it stuffs the same old information down your throat (see 6.1). I don't know if this will work for everyone, and the humour should remain a little subtle.	close to home as possible. Sweden is relatively close by so that's a good thing. Regardless, buying bananas cultivated in Sweden is bad, right? Then I remembered that I lived in a country that used to grow bananas. Its climate was starkly different from the climate in Sweden. As such, my assumption would be that growing bananas in Sweden is bad because of all the energy required to artificially create a suitable environment. I then had to guesstimate what would be worse, the artificial environment creation or the shipping? Conclusion: Buying bananas from Sweden is bad. The problem? The infographic doesn't explain if Sweden is a good or bad thing (and I am still not sure). I had to think about my experiences in life (having lived in both Scandinavia and banana-growing countries), and then estimate the CO2 equivalency between shipping and artificial heating, to come to a conclusion I am not sure of.
	But doesn't give any indication how to stop it or what action to take.
	Its too demanding.
	The sticker could be more legible, larger and better edited for maximum effect. The writing below should be clearer to read as well.

B.2.2 Visual 8: The forest fires

Table 19: Visual 8, the useful answers to VQ3 & VQ4

What elements of the visual are useful for reaching our goals?	What elements of the visual are not useful for reaching our goals?
It's shocking and effectively guilts a person into doing something about it	Perhaps the shock could have the opposite reaction, but it worked for me
The forest on fire showcases the problem well.	I think the link between forest fires and GW needs to be more clear
It is shocking which can be helpful	it doesn't tell me what action to take to stop global warming
Clear corration between climate change and forest fires	You can also show animals that are burnt, that may be even more impactful
Shows trauma	Its too demanding and sounds maybe a little like whining about it
	Unprofessional looking font

B.2.3 Visual 9: The melting glaciers

Table 20: Visual 9, the useful answers to VQ3 & VQ4

What elements of the visual are useful for reaching our goals?	What elements of the visual are not useful for reaching our goals?
The photo comparison	Many people dont care about glaciers, so its not relatable for many
It makes global warming a personal problem: no more skiing. There is a motivating message and a very clear goal.	The images do not affect enough people's lives for them to likely care enough. Consider using examples that affect everyone's daily lives as opposed to a niche holiday location.
It shows the drastic change over time, implying that there are long term effects and direct clear problems in front of us.	Glaciers do not effect people immediately, most people haven't seen them. They have been used too often and are by now more annoying then alarming.
The comparison of different years is really helpful!	The font is a bit bland, doesn't show the urgency of the situation
Very cleary shows the impact of climate change	, it does nothing to suggest an action to do
The reminder that beautifull nature is dissapearing. In Norway i saw these kind of pictures at the glaciers in Folgefonna National Park. This was a real eye-opener that climate change is real, i never forgot that moment.	Er staat "act now", ja wat dan? Zou handig zijn als er een linkje zou staan naar een website ofzo.
	Elements which are not correlated to people. Braxilians dont do snow sports. However i think we get the message
	You should include the month next to the year, because otherwise, one could be sceptical that the photographs may come from different seasons

B.2.4 Visual 10: The ice cream

Table 21: Visual 10, the useful answers to VQ3 & VQ4

What elements of the visual are useful for reaching our goals?	What elements of the visual are not useful for reaching our goals?
It is about something recognizable that everyone loves.	The idea behind is very low scale, and feels a bit too playful
It's witty and catches your attention because you know the ice cream is missing, so you want to read what it says. The text is also very effective; you start with "we're sorry" and I'm immediately enticed to read what for. And I love the "if you love ice cream" part	it doesn't explain why exactly there will be a shortage, it seems like an empty threat in some ways
Attention grabbing, confrontational	Maybe present a little more information to back up this claim

it gives people a personal incentive to stop climate change	I don't understand the immediate connection between ice cream shortage and global warming.
Humor	that the claims it makes are not correct: it's the polar ice that is making sea levels rise and thus natural cathastrophes more likely, it does not really impact ice cream
This is effecting me directly. And it is something new.	It does not explain how to change climate change, so it asks the viewer to find this information out themselves. That is not per se a big ask, but still might lead to less people changing their behavior.
that it's relatable, people care about ice cream	The rhetoric isnt my favorite, ' if you love this, you would do that' its a manipulation of language, though I understand its success for advertismenets
It's funny and personal,	it doesnt say how to help with stopping global warming
It's a more playful way, so it will attract younger people	Maybe people won't take it seriously
It might be directly relatable to someoneâ€™s daily life and what is important to them. The ice cone jumps out and makes you curious what it is about.	It's a bit of an egocentric approach since it focuses on something 'trivial' like ice cream that only humans enjoy. It doesn't show the effect on animals or vegetation, but this might be a better approach for people that just don't really care about the environment or nature.
The picture is strange, so it grabs the attention.	It is only visible in one place (except if the poster is placed on many locations). Some people might say icecream is not important and they rather want to know the environmental impact.
It is close by.	It doesnt offer a way you can help, so it's harder to take next steps. It is easy to shake of the uneasy feeling by ignoring it 2 seconds later.
Doordat er humor gebruikt wordt zullen mensen het sneller onthouden/ delen. Daarnaast denk ik dat je er een bredere doelgroep mee bereikt.	It could be seen as a joke
The ice cone jumps out and makes you curious what it is about.	Downplays severity
showing something people can relate with	It does the same as with the sking ad by telling people jokingly that they could lose a luxury (which in this case can be easily replaced by plant based products) eventough far worse things are happening as result of those very luxuries.
Simpel, effective	But also misleading
Taking away something that people love	The humor may take away from how seriously people take it

It's simple and bold	It sounds too silly to be capable of doing any real change
	It does not say where you can find information to stop global warming
	Don't think that is a good phrase to urge people to fo something
	there is really no urgent need to do something to stop it from happening.
	Incorrect information is not useful for making people aware
	I don't think the text or the premise is very engaging
	It is not directly linked to global warming, which makes it less effective
	It is a little infantile
	Maybe it's too playful and a bit far fetched

B.2.5 Visual 11: The polar bear

Table 22: Visual 11, the useful answers to VQ3 & VQ4

What elements of the visual are useful for reaching our goals?	What elements of the visual are not useful for reaching our goals?
The polar bear on how the situation is now.	it became too frequent and people got used to it
Very upsetting.	It is too far away from home, people will not directly relate to it. Also maybe the bear is skinny for a random other reason, this image is just speculation and assumptions the way it is presented
it provokes an emotional response from whoever is looking	It does not give information on how to save the polar bear. The image either assumes the viewer already knows or asks them to do their own research, both might lead to people not being interested or to a smaller group of people being affected.
The visual, and big slogan/action	The bear is shocking, but not directly my reason to start a change, there are a lot of sad animals
the polarbear in the middle of the water and its stance convey the stress and urgency of the message well.	it can scare people off, and it doesnt really say how to help
empathy	it could scare viewers
Shows severity	Doesn't say how you can help
You show the reality. It will make people feel uncomfortable	you aren't told WHAT you can do
I mean, it's a real and very shocking image of such an unnourished polar bear. It sure hits where it aims to.	It isn't a problem that I feel the direct consequences of. It also feels like a problem to big for me to have a significant contribution to.

It shows the impact	
Plays to the empathy. Poor bear.	A far away problem with not much direct impact
Het is een pakkend plaatje, wat mensen raakt in hun emoties	I think most people don't really care so much about polar bears that they will change anything in their life for them
It appeals very strongly to people's emotions and also has a very urgent	It's easy to ignore the polar bear, since we don't see him in our daily live. It's not clear this is happing due to climate change
It shocks you wich will help with the message to stick	the image looks generic, I had seen lots of images like these before
Because of the dying polar bear on the poster it plays with the emotions of people	It's a pretty sad visual, and it makes you feel responsible and guilty for your actions. For some people this approach of showing sad images just doesn't work as well and makes them feel more hostile towards it.
pretty shocking polarbear image, yet again, I already know we are dying, what can I do about it, how can I help to stop climate change	Text. It is already clear from the visual that the polar bear needs help. The text could be something that people can do, like go by bike to your work (to save the polar bear)
	Scary image, people care more about impact on their lives than bears
	People could possible look the other way when seeing stuff like this, because they don't want to see animals in this kind of way
	I think this message doesn't bring a clear call to action.

B.2.6 Visual 12: The water in the streets

Table 23: Visual 12, the useful answers to VQ3 & VQ4

What elements of the visual are useful for reaching our goals?	What elements of the visual are not useful for reaching our goals?
Trying to get the viewer to understand the consequences	I donâ€™t think they relate to it enough
There is a direct problem which effects me	It is not really clear what you can do yourself.
I guess it reminds me that climate change is a thing.	It doesnt seem like it would actually effect you, or happen to you, so it doesnt scare you
There is a strong WHY and WHAT The picture is confronting the viewer with the possible reality. People can relate to it because it is a street in a city. The statement is clear and bright.	There are people who deny it and dont believe what the visual says
Use of fear appeal since the image is extreme	Feels like deliberate scaremongering. can I personally verify the information on the poster).
	No follow up, it looks unprofessional

Maybe add a HOW? Link to a website? Political party? Stop eating meat written in the corner?
the image falls to the background. If this is more balanced it will bring the message much bette
Without proper acknowledgment that this is a natural cause and not a man made city planning error, it is gaslighting
Using the word could sounds unsure. Use stronger language like will.
not necessarily something that would make people aware of their own choices and the consequences of them regarding climate change
if the actual problem (main thing) in the image (all the water) is so easily overlooked then i don't think it will be helpful to achieve any goals.
honestly the yellow font makes it look more like a meme than a real concern